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Northrop Grumman Systems Corporation

2019 ANNUAL OPERATION, MAINTENANCE AND MONITORING REPORT

Operable Unit 2 - Groundwater

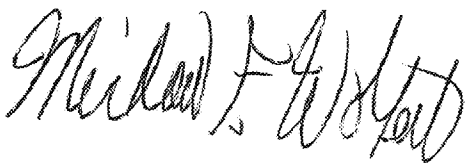
Bethpage, New York

NYSDEC Sites # 1-30-003A and 1-30-003B

March 31, 2020

Christopher Engler, PE
Engineer of Record | New York PE-069748

Arthur Zahradnik
Project Manager



Michael F. Wolfert
Project Director

2019 ANNUAL OPERATION, MAINTENANCE AND MONITORING REPORT

Operable Unit 2

Northrop Grumman Systems Corporation
Bethpage, New York
NYSDEC Site # 1-30-003A

Naval Weapons Industrial Reserve Plant
Bethpage, New York
NYSDEC Site # 1-30-003B

Prepared for:

Northrop Grumman Systems Corporation

Prepared by:

Arcadis of New York, Inc.

Two Huntington Quadrangle

Suite 1S10

Melville

New York 11747

Tel 631 249 7600

Fax 631 249 7610

Our Ref.:

30017989.RPTI4

Date:

March 31, 2020

CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

Arcadis of New York, Inc. (Arcadis) on behalf of Northrop Grumman Systems Corporation (Northrop Grumman), has prepared this Operable Unit 2 (OU2) 2019 Annual Operation, Maintenance and Monitoring (OM&M) Report to document OM&M activities conducted for the on-site portion of the OU2 groundwater remedy at the former Northrop Grumman, Bethpage, New York facility (Site No. 1-30-003A) and the former Naval Weapons Industrial Reserve Plant (NWIRP), Bethpage New York (Site No. 1-30-003B) (herein referred to as the "Site"). This report has been prepared consistent with the requirements stipulated in the OU2 Record of Decision (ROD) issued for the Site by the New York State Department of Environmental Conservation (NYSDEC) in March 2001.

This report also documents the results of:

- Groundwater monitoring of volatile organic compounds (VOCs) in areas upgradient of, proximate to and downgradient (off-site) of the On-site Containment (ONCT) System, including groundwater monitoring of VOCs in former outpost wells upgradient of public water supply well fields.
- Groundwater monitoring of metals in the vicinity of the former Northrop Grumman Plants 1 and 2.

The above activities were conducted by Northrop Grumman to meet the remedial action objectives (RAOs) set forth in the March 2001 OU2 ROD (NYSDEC 2001), and in accordance with the OM&M Manual (Arcadis, 2014a), August 2015 Groundwater Monitoring Plan Addendum (Arcadis, 2015), and the latest (June, 2016) Updated Groundwater Monitoring Plan (Arcadis 2016a). The above-referenced OM&M manual and monitoring plans were submitted to the NYSDEC pursuant to the OU2 Administrative Order on Consent (NYSDEC, 2015a) Index # W1-118-14-12, executed April 21, 2015 (NYSDEC, 2015a). The NYSDEC conditionally approved the Groundwater Monitoring Plan Addendum in August 2015 (NYSDEC, 2015b).

This report describes the performance and effectiveness monitoring of the on-site portion of the OU2 groundwater remedy (also referred to as the ONCT system) for the Fourth Quarter 2019 (current period) and the Year 2019 (reporting period). As such, this report is effectively the Fourth Quarter Report for 2019 and is also the 2019 Annual Report and provides the basis to prepare an annual engineering certification of the ONCT system as required by the OU2 Administrative Order on Consent (AOC) with the NYSDEC, and as warranted by evaluation of the data herein. In this report, the current period data was compared to data in the previous three 2019 quarterly reports issued by ARCADIS (2019b; 2019c; 2019d) and to longer-term data trends (also referred to as the period of record), as applicable.

Off-site groundwater monitoring of the OU2 plume is also required and detailed in this report to the extent undertaken by Northrop Grumman and supplemented in some cases with data reported by Navy. However, this report does not summarize in detail the activities conducted by the Navy at the former NWIRP property nor the ROD-required off-site components of the groundwater remedial program, as these activities are managed and maintained by the Navy and are reported under separate cover. The Navy activities include monitoring of the GM-38 hotspot, OM&M of the GM-38 groundwater extraction and treatment system, monitoring of VOC-impacted groundwater identified in the vicinity of Navy's Vertical Profile Borings (VPB) VBP-139 and VPB-142 (also referred to as the RE-108 hot spot), off-site

groundwater investigation, and components of the public water supply contingency plan (i.e., additional outpost well installation and monitoring).

2 SITE OVERVIEW

This section provides a brief description of the Site, relevant history, main features/components of the ONCT system, associated remedial program and describes the RAOs specified in the OU2 ROD.

2.1 Description of Site

The former Grumman Aerospace Corporation (now the Northrop Grumman Systems Corporation) (NYSDEC Site # 1-30-003A) occupied approximately 600 acres in east-central Nassau County, in the Hamlet of Bethpage, Town of Oyster Bay, New York and, within this area, the NWIRP (NYSDEC Site # 1-30-003B) occupied approximately 105 acres. The Site was bounded by Stewart Avenue to the north, South Oyster Bay Road to the west, Route 107 to the southwest, Central Avenue to the south and various residential and commercial areas to the east. Currently, Northrop Grumman occupies and/or owns the parcels identified in **Figure 1**. The former NWIRP (NYSDEC Site # 1-30-003B) site is located adjacent to the former Northrop Grumman site. Also, the former Occidental Chemical Corporation (OXY)/Hooker Chemical Corporation/RUCO Polymer Corporation site (referred to throughout this report as the OXY Site) (NYSDEC Site # 1-30-0004) is located adjacent to the northwest portion of the Site and is generally hydraulically upgradient of the former Northrop Grumman site.

2.2 Nature and Extent of Impacted Groundwater

Groundwater sampling conducted as part of the Remedial Investigations (RIs) for the former Northrop Grumman, NWIRP, and OXY sites indicates that past chemical storage and/or waste disposal at each of these sites has resulted in impacts to groundwater (i.e., the upper glacial and Magothy aquifers). The primary groundwater constituents of concern (COCs), based on concentrations and frequency of detection, for the former Northrop Grumman and NWIRP sites are chlorinated VOCs, primarily: trichloroethylene (TCE); tetrachloroethene (PCE); 1,1,1-trichloroethane (1,1,1-TCA); 1,2-dichloroethene (1,2-DCE); 1,1-dichloroethene (1,1-DCE); and 1,1-dichloroethane (1,1-DCA). Groundwater associated with the former OXY site contains these COCs as well, with the addition of vinyl chloride (VC). Metals are COCs in groundwater in the vicinity of the former Northrop Grumman Plants 1 and 2 (chromium and cadmium/chromium, respectively). The 1994 RI Report (Geraghty & Miller 1994) describes the overall extent (on-site and off-site) of groundwater impacts prior to remedial activities.

2.3 Remedial Action Objectives

The overall remedial goals for groundwater, as stated in the OU2 ROD, is to meet Standards, Criteria, and Guidance values (SCGs) and be protective of human health and the environment.

Consistent with the remedial goals selected for the Site, the RAOs for OU2, either in whole or in part, are to:

- Eliminate, to the extent practicable, site-related constituents from the affected public water supplies and prevent, to the extent practicable, the future impacts to public water supplies.
- Eliminate, to the extent practicable, exposures to impacted groundwater.
- Eliminate, to the extent practicable, off-site migration of impacted groundwater and, where practicable, restore the groundwater to pre-disposal conditions.
- Eliminate, to the extent practicable, the off-site migration of soils impacts entering the groundwater.
- Eliminate, to the extent practicable, exceedances of applicable environmental quality standards related to releases of constituents to the waters of the state.
- Comply with applicable NYSDEC SCGs for OU2 ONCT system treated water and air. The discharge requirements for water and air are provided in the OM&M Manual (Arcadis, 2014).

2.4 Main Features/Components of the Remedy

Based on the OU2 ROD, and as presented in **Figures 2 and 3**, the following are the major elements of the remedial program and components of the OU2 On-Site Groundwater Remedy, which is designed to actively remediate the on-site portion of the VOC-impacted groundwater:

- Operation, maintenance and monitoring of the OU2 ONCT system to address on-site impacted groundwater. The OU2 ONCT system consists of:
    - Five Remedial Wells (Remedial Wells 1, 3R, 17, 18, and 19) with design (groundwater model-based) pumping rates of 800 gallons per minute (gpm), 700 gpm, 1,000 gpm, 600 gpm and 700 gpm, respectively.
    - Remedial Well 3R was brought online in 2013 to replace Remedial Well 3 due to the declining specific capacity, a measure of the well's production efficiency, of Remedial Well 3.
    - Two treatment systems (Tower 96 and Tower 102), each consisting of a packed-tower air stripper to remove VOCs from extracted groundwater and regenerable vapor-phase granular activated carbon (RVPGAC) systems, with on-site steam regeneration via on-site boilers, to remove VOCs from the air strippers' off-gas emissions.
    - Supplemental air treatment at Tower 96, consisting of two vapor-phase granular activated carbon (VPGAC) polishing beds maintained by Northrop Grumman. Previously, air treatment (provided by OXY) had consisted of VPGAC and potassium permanganate-impregnated zeolite (PPZ). NYSDEC concurrence to stop OXY's air treatment of VC was received on January 26, 2017. The OXY carbon unit was removed from service on January 26, 2017 and subsequently the PPZ was removed on March 23, 2017.
    - A pressurized, discharge main to accept the treated water discharge and for limited non-potable reuse.
    - Two sets of recharge basins (the South Basins and the West Basins) accept the treated water from the clear wells, which drain by gravity to the basins. A minimum design groundwater model-based discharge rate of 2,231 gallons per minute (gpm) exists for the South Basins and any remaining volume is directed to the West Basins, as necessary.

- A groundwater monitoring program to assess the overall OU2 On-Site Groundwater Remedy environmental effectiveness and a performance and compliance monitoring program at the treatment plants. The groundwater monitoring program also includes monitoring upgradient of public water supply wells. These wells were initially installed to serve as outpost wells and sampled in accordance with the Public Water Supply Contingency Plan (PWSCP) (Arcadis G&M, Inc., 2003a). However, these wells have served the purpose outlined in the PWSCP and were repurposed as monitoring wells in 2015. The monitoring and former outpost wells included in Northrop Grumman's OU2 groundwater monitoring program, for which Northrop Grumman is responsible for reporting, and additional wells in the Site vicinity are shown in **Figure 1**. Monitoring and outpost wells for which Navy has responsibility for reporting are not shown in **Figure 1**.

3 OPERATION AND MAINTENANCE

The following subsections provide a summary of the routine and non-routine operation and maintenance activities completed during the 2019 reporting period to meet the requirements outlined in the OM&M Manual (Arcadis, 2014a), as well as a performance evaluation of the remedial treatment systems.

3.1 Summary of Completed O&M Activities

The O&M of the ONCT system was conducted in accordance with the OU2 ONCT OM&M Manual (Arcadis, 2014a), and consisted of the following:

- Daily site visits to visually check the system for proper operation, leaks or potential emergency situations. Additionally, the ONCT system was continuously monitored by the Supervisory Control and Data Acquisition (SCADA) system. Daily site visit logs (paper forms and electronically collected data) are included in **Appendix A**.
- Weekly site checks by Northrop Grumman personnel to monitor and record key process parameters to confirm proper system operation, to assess whether a process parameter is changing, and to provide information that may be helpful later in case there is an operational problem. A summary of the weekly monitoring data collected for Tower 96 and Tower 102 is provided on **Tables 1A and 1B**, respectively.
- Routine maintenance by Northrop Grumman personnel of equipment was performed in accordance with the manufacturers' specifications or otherwise, as needed, and per the OU2 ONCT OM&M Manual (Arcadis, 2014a) routine maintenance schedule and checklist.
- Solvent recovered by the VPGAC system, was characterized as a hazardous waste and was drummed, temporarily staged in a hazardous waste storage area, and properly transported and disposed of off-site by a Northrop Grumman subcontractor in accordance with applicable regulations. Copies of the completed hazardous waste manifests are included in **Appendix B**.
- Non-routine maintenance of equipment and system components was performed in response to alarm conditions, physical damage, or systems parameters operating outside of their normal operating ranges.

A detailed breakdown of the non-routine maintenance activities completed during the 2019 annual period is provided on **Table 2**; and, a summary of the major non-routine maintenance activities is provided below:

- As previously reported basin maintenance has been required since the Fourth Quarter of 2017 to improve basin infiltration for the continued, effective long-term operation of the ONCT system. During 2019, these activities continued, and the remaining basin maintenance associated with the ONCT system was completed. Specifically, scraping and sediment removal of the eastern South Basin and the northernmost West Basin was completed in 2019. During this time, the eastern South Basin was taken offline and the central and western South Basins along with the northernmost West Basin (Outfall 006) were utilized for ONCT discharge. As reported in an email to the NYSDEC dated September 29, 2017, this maintenance was required to improve basin infiltration for the continued, effective long-term operation of the ONCT system. Additionally, a staff gauge was installed and two headwalls were also repaired in the eastern South Basin on November 8, 2019, and various distribution chamber maintenance was completed throughout 2019.
- A Remedial Well assessment and rehabilitation program was completed at the Site in the Third and Fourth Quarters of 2019 to improve the specific capacity of Remedial Well 3R and gauge the need to rehabilitate Remedial Well 17. The Phase I well assessment effort resulted in Remedial Well 17 downtime between July 22, 2019 and July 31, 2019 and Remedial Well 3R downtime between July 15 and 31, 2019. The Phase I well assessment for both wells generally included the removal and inspection of all downhole equipment, video-logging the wells and bailing of sediments at Remedial Well 17. Based on the results of the Phase I assessment effort, a Phase II rehabilitation effort was completed, resulting in Remedial Well 3R downtime between October 9, 2019 and December 13, 2019. The Phase II rehabilitation effort included: inspection of all down hole equipment and interior well integrity; removal of in-well sediments; a light acid treatment and chlorine disinfection of the well screen; and pumping test. It should be noted that the extraction rates at Remedial Well 1 and Remedial Well 18 were generally increased during the well assessments and rehabilitation to ensure continued containment of the on-site plume, as further detailed below in **Section 4.2.4**.
- A condensate pump failure caused Tower 96 to shut down between September 13, 2019 and September 30, 2019.
- Sluice gate repairs resulted in downtime at Tower 102 in December 2019.

3.2 Performance Evaluation

This subsection provides an evaluation of OU2 ONCT system performance throughout 2019. The OU2 ONCT system operation in 2019 was consistent with operation in previous years. An associated compliance evaluation is provided below in **Section 4.2**.

An operational summary of the remedial wells, discharges, and treatment system efficiencies for 2019 is provided on **Table 3** and summarized below:

- The remedial wells extracted a total of 1,877 million gallons (MG) of groundwater in 2019. The individual remedial wells pumped at the following annual aggregate percentages of their design

volumes: Remedial Well 1 (101%), Remedial Well 3R (77%), Remedial Well 17 (93%), Remedial Well 18 (135%), and Remedial Well 19 (70%).

- In general, the percentage of design volumes less than 100% (i.e., Remedial Wells 3R, 17, and 19) was due to pumping interruptions for routine and non-routine maintenance in 2019, particularly for the implementation of a required remedial well assessment and rehabilitation program, as outlined above in **Section 3.1**. The pumping volume for Remedial Well 1 and Remedial Well 18 were greater than 100% of their design volumes to enhance on-site containment and VOC mass removal during the required remedial well assessment and rehabilitation program, as further detailed below in **Section 4.2.4**. Reduced pumping volume at Remedial Well 19 was maintained through 2019 (pumping the well at an average rate of 500 gpm), as Remedial Well 19's capture zone continues to extend into the OU3 plume. This reduced pumping rate prevents over-pumping of Remedial Well 19, which would have the potential to interfere with the plume associated with the nearby OU3 area, while at the same time exceeding the requirements set forth by the OU2 ROD.
- As a result of multiple wells being operated at flow volumes lower than their design flow volumes, due primarily to the Remedial Wells 3R and 17 downtime for assessment and maintenance events, a groundwater flow and solute transport modeling assessment was completed to assess whether the OU2 ONCT system continued to be effective at meeting its objective of on-site containment of VOC-impacted groundwater under these atypical conditions. This assessment is summarized in **Section 4.2.4,** with additional details provided in **Appendix C**.
- The OU2 ONCT system operated continuously in 2019, with the exception of shutdown periods for routine maintenance, alarm conditions, Remedial Well 3R rehabilitation, Remedial Wells 3R and 17 inspections, replacement of sluice gates as part of South Basins maintenance, and a Tower 96 condensate pump failure. The remedial wells operated for the following "uptime," calculated as a percentage of the reporting period: Remedial Well 1 (96%), Remedial Well 3R (77%), Remedial Well 17 (91%), Remedial Well 18 (94%), and Remedial Well 19 (94%).
- The water treatment components of the OU2 ONCT system (air stripper/clear well) performed within acceptable operating ranges for this reporting period, as indicated by the following:
    - The air stripper VOC removal efficiencies were greater than 99.9% (**Table 3**).
    - The air stripper effluent water discharges complied with applicable SCGs (**Table 4**). Additional details regarding system water monitoring are discussed in **Section 4**.
- The air treatment components of the OU2 ONCT system (RVPGAC/solvent recovery) performed within acceptable operating ranges during this reporting period. The RVPGAC stack discharges complied with applicable SCGs and discharge limits (**Tables 5A, 5B, 6A, and 6B**).
- Additional maintenance and assessment of the OU2 ONCT system's critical alarms, SCADA system functionality and set points was conducted during the reporting period and continued through March 2020. This effort was conducted to ensure that the alarms were functioning properly, would shut down the treatment systems and remedial wells in the event of an alarm condition, and that the set points were properly established in relation to the design criteria and current treatment system operating conditions.

4 MONITORING

This section provides a summary of the monitoring completed during the 2019 reporting period to meet the requirements outlined in the OM&M Manual (Arcadis, 2014a), the associated Updated Groundwater Monitoring Plan (Arcadis 2016a) and the PWSCP (Arcadis G&M, Inc., 2003a). The following subsections provide summaries of 2019 monitoring data and comparisons of sample analytical results to applicable SCGs. Also included are additional data evaluations describing the performance, compliance and effectiveness of the ONCT system and a groundwater modeling assessment to more fully evaluate the hydraulic effectiveness of the ONCT system during 2019. Finally, key findings are presented that support overall conclusions and suggestions regarding the overall ONCT and remedial program at the Site.

4.1 Summary of Monitoring Completed

A summary of the monitoring completed in accordance with the above-referenced plans is provided below:

- Quarterly remedial system performance monitoring:
  - Remedial well water quality monitoring was completed to monitor the performance of the system and assess VOC mass removal. A summary of the VOC results, as well as 1,4-dioxane, are provided on **Table 4**.
  - Water quality monitoring of treatment system effluent (Towers 96 and 102) was completed to monitor the performance of the groundwater treatment components of the OU2 ONCT system. A summary of the VOC and 1,4-dioxane analytical results is provided on **Table 4**.
  - Air quality monitoring of treatment system influent, mid-effluent and effluent (Towers 96 and 102) was completed to monitor the performance of the air treatment components of the OU2 ONCT system. A summary of the analytical results is provided on **Tables 5A and 5B** for the Tower 96 and 102 treatment systems, respectively.
- Remedial system compliance monitoring:
  - Water quality monitoring of treatment system influent, mid-train and effluent was completed to gauge quarterly TCE mass removal for the Tower 96 and 102 treatment systems, and a summary of the analytical results is provided on **Tables 5C and 5D**, respectively.
  - Quarterly air monitoring and modeling was completed to determine the compliance status of the air discharged from the Tower 96 and 102 treatment systems, and a summary of the results is provided on **Tables 6A and 6B**.
  - Monthly State Pollutant Discharge Elimination System (SPDES) monitoring was completed to verify that water discharged to the South Basins (i.e., Outfall 005) and West Basins (i.e., Outfall 006) met permit requirements. Monitoring was performed in accordance with the terms and conditions of Northrop Grumman's SPDES Permit No. NY0096792 and discharge limits, per the SPDES permit equivalency, dated October 12, 2017, amended on July 30, 2018 and transmitted by the NYSDEC to Northrop Grumman on August 9, 2018. A summary of the analytical results is provided on **Table 7**. SPDES discharge monitoring data are documented on a monthly basis by Northrop Grumman in Discharge Monitoring Reports (DMRs) that are transmitted to the NYSDEC

under separate cover. Copies of DMRs completed during this reporting period are provided in **Appendix D**.

- Effectiveness Monitoring:
  - Groundwater hydraulic (water-level) monitoring was completed to determine, monitor and document local and regional groundwater flow patterns during operation of the OU2 ONCT system, including the vertical and horizontal extent of the cumulative capture zone created by operation of the OU2 ONCT system.
  - Routine hydraulic monitoring was performed from April 2 to April 11, 2019 (Second Quarter 2019) and December 17 to December 19, 2019 (Fourth Quarter 2019). **Tables 8 and 9** provide the water-level measurement data for the second and fourth quarters, respectively. Data for select Navy monitoring wells, as suggested in the 2017 Annual OM&M Report (Arcadis, 2018a), is included in these Tables as supplemental data.
  - Groundwater quality monitoring was completed to confirm the effectiveness of the OU2 ONCT system with respect to containment and removal of OU2 VOC-impacted groundwater and preventing its off-site migration by monitoring groundwater conditions at and downgradient of the Site. Groundwater quality monitoring was performed quarterly for VOCs and 1,4-dioxane at outpost monitoring wells; semi-annually for VOCs, 1,4-dioxane and cadmium/chromium at select on-site and off-site wells (Second and Fourth Quarters of 2019); and annually for VOCs and 1,4-dioxane at remaining on-site and off-site wells in the groundwater monitoring network (Second Quarter of 2019). It should be noted that 1,4-dioxane samples are analyzed using USEPA Method 8270D SIM CLLE for all monitoring wells, while samples collected from outpost wells continue to be analyzed using USEPA Method 522, similar to water supply well requirements. The groundwater quality monitoring performed in 2019 incorporates modifications consistent with the GWMP (Arcadis, 2016a). Groundwater quality results are provided on **Tables 10 through 14**.

    Groundwater quality results associated with the First, Second, and Third Quarters of 2019 have been previously submitted to the NYSDEC in quarterly reports and are also included in this report for completeness. Copies of completed Groundwater Sampling Logs and Chain of Custody Records are provided in **Appendix E**. Additionally, supplemental monitoring of monitoring wells GM-21D2, GM-20D, GM-33D2 and GM-75D2 was continued on a quarterly frequency in 2019 to supplement the results of the modeling assessments completed as part of the 2017 Annual OM&M Report (Arcadis, 2018) and 2018 Annual OM&M Report (Arcadis, 2019a). The supplemental monitoring results have been previously submitted to the NYSDEC in quarterly AOC Progress reports and are not included herein; however, these supplemental data are incorporated into the overall evaluation of groundwater quality as part of TVOC concentration trends discussed in **Section 4.2.5**, as necessary.

4.2 Summary of Monitoring Results

Results of monitoring completed during the reporting period are discussed in the following subsections. It should be noted that the analytical data associated with the OU2 ONCT system were and continue to be submitted to the NYSDEC on a quarterly basis in electronic data deliverable (EDD) format, which

complies with the NYSDEC requirements outlined in Section 1.15(a)2 (Electronic Submissions) of NYSDEC's May 2010 DER-10 guidance document.

4.2.1 Remedial System Performance Monitoring

The OU2 ONCT system remedial well influent concentrations, VOC mass recovered, VOC mass removal rates, and TVOC trends over time are provided on **Tables 3, 4,** and **Figures 4, 5, 6, 7** and are summarized below:

- TVOC influent concentrations within the remedial wells ranged from 54 micrograms per liter (µg/L) (Remedial Well 18) to 620 µg/L (Remedial Well 1) (**Table 4**). TCE and PCE were detected at the highest concentrations in all remedial wells, with the exception of Remedial Well 19, where TCE and cis-1,2-dichlorothene (cis-1,2-DCE) were detected at the highest concentrations. TVOC concentrations continue to exhibit decreasing trends within all Remedial Wells since 2016 (**Figure 7**).
- VC was only detected in Remedial Well 3R (**Table 4**), as it's minimum pumping rate was set to capture/contain VC entering the Site from the OXY site. OXY is conducting remediation of groundwater (i.e., biosparge system) to address VC upgradient (northwest) of Remedial Well 3R under United States Environmental Protection Agency (USEPA) oversight.
- A calculated 3,832 lbs of TVOCs were removed from the aquifer and treated by the OU2 ONCT system in 2019 (**Table 3** and **Figures 4, 5 and 6**). The majority of VOC mass was recovered by Remedial Well 1 (53%) and Remedial Well 3R (20%). The VOC mass removed in 2019 was similar to the mass removed in 2018 (3,868 lbs).
- Since full-time startup of the ONCT system in November 1998, approximately 212,000 lbs of VOCs have been removed from the aquifer and treated by the ONCT system (**Table 3**).

4.2.2 Remedial System Compliance Monitoring

4.2.2.1 Water Discharge

The OU2 ONCT system's treated groundwater effluent met SPDES permit limits during the reporting period (**Table 7** and **Appendix D**). The measured concentrations of individual VOCs, nitrogen and pH levels in the treated effluent were below applicable discharge limits.

4.2.2.2 Air Discharge

Influent air concentrations for the annual period were compared to the degree of treatment required pursuant to 6NYCRR III A Part 212-2.3(b):

- As shown on **Table 5A**, concentrations of all compounds detected in Tower 96 influent air, with the exception of TCE, were less than 5,549 µg/m^3 (concentration equivalent to 0.1 pounds per hour at a flow rate of 4,821 cubic feet per minute). For those compounds, air dispersion modeling is necessary to demonstrate that the maximum off-site air concentration is less than the NYSDEC DAR-1 annual guideline concentrations (AGC/SGC) values issued August 10, 2016. TCE, an A-rated compound, exhibited the highest concentration of a single VOC compound in influent air by an order of

magnitude. TCE was detected at concentrations of greater than 13,000 µg/m^3 (0.24 pounds per hour) in influent air throughout the reporting period (ranging in concentration from 14,776 µg/m^3 to 24,449 µg/m^3) and requires 90% removal. Based on the influent and effluent TCE concentrations, the treatment system achieved TCE removal rates of greater than 99% (**Table 3**).

- As shown on **Table 5B**, concentrations of all compounds, with the exception of TCE, detected in Tower 102 influent air were less than 3,420 µg/m^3 (concentration equivalent to 0.1 pounds per hour at a flow rate of 7,822 cubic feet per minute). For those compounds, air dispersion modeling is necessary to demonstrate that the maximum off-site air concentration is less than the NYSDEC DAR-1 AGC/SGC values issued August 10, 2016. TCE, an A-rated compound, was not detected at concentrations greater than 3,420 µg/m^3. Based on the influent and effluent TCE concentrations, the treatment system achieved TCE removal rates greater than 99%.
- As shown on **Tables 5C and 5B,** TCE mass emissions at Tower 96 and Tower 102 were well below the maximum allowable discharge limit for TCE of 500 pounds per year for 2019.

The USEPA air quality dispersion model AERMOD was used to estimate the highest ambient air concentrations of the compounds on **Tables 5A and 5B**. AERMOD is the USEPA's recommended best state-of-the-art practice Gaussian plume air dispersion model. Gaussian models are the most widely used techniques for estimating the impact of non-reactive pollutants, per Appendix W of Title 40 Code of Federal Regulations (CFR) 51 – Guideline of Air Quality Models. Additionally, this modeling analysis was completed in accordance with NYSDEC's Guidelines on Dispersion Modeling Procedures for Air Quality Impact Analysis (DAR-10).

The following parameters were used for the AERMOD model analysis:

- Urban dispersion coefficients.
- AERMAP base and terrain elevations, processed using National Elevation Dataset (NED) digitized terrain data.
- Surface and upper air observations measured at the Nation Weather Service stations located at Farmingdale and Brookhaven airports for calendar years 2011-2015, in accordance with NYSDEC's DAR-10 Air Dispersion Modeling Guidance Document. This longer period of time was reviewed for the model run to provide a conservative estimate of the potential atmospheric off-site concentrations.
- Receptor grids, per the following methodology:
    - For Tower 96 and Tower 102, receptors were located along the property boundary at distances not exceeding 25 meters between receptors.
    - For Tower 96, 1.5 km x 1.5 km Cartesian grid receptors with distances of 50 meters between the receptors and 3.0 km x 3.0 km Cartesian grid receptors with distances of 100 meters between the receptors.
    - For Tower 102, discrete receptors were located off-site at distances not exceeding 50 meters, up to 500 meters from the plant boundary with additional off-site receptors placed at greater distances beyond 500 meters and discrete receptor spacing around the points of maximum predicted impacts did not exceed 50 meters.

- For Tower 96 and Tower 102, emission rates: 1 gram per second (g/s).

Tables 6A and 6B provide the compound-specific scaled hourly ambient air impact and the scaled annual ambient air impact for the Fourth Quarter sampling event. As shown here for Fourth Quarter and previously in the First through Third Quarter reports for 2019 (Arcadis 2018b; Arcadis 2018c; Arcadis 2018d), the scaled potential ambient air concentrations for Tower 96 and Tower 102 are below the corresponding SGCs and AGCs.

4.2.3 Remedial System Effectiveness Monitoring

In general, "mounding" of the water table as a result of the discharge of treated water to on-site recharge basins is expected to be most evident in the Shallow/Intermediate Zones of the aquifer. Remedial well pumping generates "a cumulative cone of depression" (area of lowered water levels), which is expected to be most clearly evident in the Deep2 zone where the remedial wells are screened. Groundwater flow in the vicinity of the OU2 ONCT system is expected to have a vertical component downward from the shallower portions of the aquifer to the deeper portions of the aquifer. In general, these expectations are being realized as documented in previous annual reports and as further discussed below for 2019.

Hydraulic monitoring was performed from April 2 to April 11, 2019 (Second Quarter 2019) and December 17 to December 19, 2019 (Fourth Quarter 2019); **Tables 8 and 9** provide the water-level measurement data, respectively. **Table 15** summarizes vertical hydraulic gradients for key monitoring well pairs in the vicinity of the OU2 ONCT system (which were calculated using the December 2019 water-level measurements) and compares these gradients to groundwater model-predicted gradients (both direction and magnitude) ONCT System design rates.

Figures 9 and 10 depict groundwater elevations and flow directions in the Shallow/Intermediate zone and Deep2 zone, respectively, during operation of the OU2 ONCT system in December 2019. As identified in previous annual reports, the hydrogeologic zones are based on the layering in the regional groundwater flow model. It should be noted that the assignment of monitoring wells to the various hydrogeologic zones of the aquifer system, as referenced in this report and identified on various tables, including **Tables 8 and 9**, has been modified to be consistent with updates to the vertical discretization (layering), of the regional groundwater flow model. The regional groundwater flow model layering was updated to reflect changes in the understanding of area hydrostratigraphy based on vertical profile boring data collected as part of investigations completed by Northrop Grumman and the Navy. These changes include revisions to the interpreted elevation of the top of the Raritan Formation (lowered by an average of 178 feet), as well as a revised understanding of the average thickness of the Magothy Formation beneath the Site (approximately 750 feet thick and increasing to approximately 1,000 feet thick further south of the Site [Arcadis 2019e]).

Figure 9 shows that mounding of the water table exists in the Shallow/Intermediate zone, extending beneath the South Basins and across the Site southern boundary. Data summarized on **Table 15** indicate that vertical hydraulic gradients are generally downward and, therefore, consistent with the expectation of the vertical groundwater flow stated above. Additionally, the vertical gradients generally agree with the model-predicted gradients, which are predominantly downward with one exception at well pair GM-

74D2/74D3 where the field observed gradients are upward. At this location, the model-predicted gradient is also upward, reflecting the localized influence of remedial well pumping in the Deep2 zone. Mounding and downward vertical gradients direct shallower groundwater vertically downward into the Deep2 zone, where it is extracted by the ONCT remedial wells. **Figure 10** shows that the ONCT remedial wells have developed a cumulative zone of capture in the Deep2 zone that extends downgradient of the Site (see groundwater divide depicted in **Figure 10**), in the vicinity of Central Avenue and encompasses the on-site area of VOC-impacted groundwater.

4.2.4 ONCT Hydraulic Effectiveness Program

Overall TVOC Distribution Evaluation

To support an evaluation of the hydraulic effectiveness of the OU2 ONCT system, including during periods of 2019 when portions of the OU2 ONCT system were shut down for routine and non-routine maintenance (such as basin maintenance and remedial well assessment/rehabilitation efforts), Arcadis developed multiple plan and cross-sectional view figures (both perpendicular and parallel to ambient groundwater flow); these provide a comprehensive three-dimensional interpretation of TVOC concentrations in the Deep, Deep2 and Deep3 zones at and downgradient of the Site. For evaluation purposes, TVOC concentrations refer to the sum of 23 identified "site-related" VOCs and exclude 1,4-dioxane.

Figures 11 through 16 provide a three-dimensional interpretation (Earth Volumetric Studio [EVS]) of analytical data (generated during the 2019 annual monitoring period) from multiple key OU2 on-site and off-site Northrop Grumman monitoring and remedial wells. In addition, the figures are supplemented with the most recently available analytical data generated through the 2019 annual monitoring period from key off-site Navy monitoring wells, vertical profile borings and key Bethpage Water District public supply wells.

Figure 11 depicts a plan view of the overall TVOC distribution (maximum concentrations in all zones) at and downgradient of the Site and the locations of two key cross-sections: A to A', located west-east along the former Northrop Grumman site southern boundary, perpendicular to regional ambient groundwater flow; and B to B', located northwest-southeast from the southernmost portion of the Site to the Bethpage Water District Well Field 6, downgradient from the Site and parallel to regional ambient groundwater flow. **Figures 12 and 13** respectively, provide A to A' and B to B' cross-sectional interpretations of TVOC concentrations in groundwater from the water table to the top of the Raritan confining unit, which is the bottom of the Magothy aquifer. **Figures 14 through 16** provide plan-view interpretations of maximum TVOC concentrations in the Deep, Deep2 and Deep3 zones, respectively.

Key findings based on review of these interpretive figures are summarized below:

- Plan-view **Figures 11 and 14 through 16** show bifurcation of the plume (TVOC distribution) as evidenced by an area of less than 5 µg/L TVOCs on and off-site near the southern boundary of the Site, which was induced by the continued pumping of the ONCT remedial wells and recharge of clean water to the South Basins. As pumping continues, bifurcation of the plume and the associated "clean water" front will continue to develop downgradient of the ONCT system as on-site VOC-impacted

groundwater continues to be removed from the aquifer by pumping the remedial wells and treated water continues to be discharged/recharged at the South Basins.

- Based on the west-east A to A' cross-sectional interpretation provided as **Figure 12**, Remedial Wells 17 through 19 continue to intercept on-site contaminants at the southern boundary of the Site.
- The northwest-southeast B to B' cross-sectional interpretation provided as **Figure 13** depicts the bifurcation of the groundwater plume over an area containing TVOCs at concentrations of less than 5 µg/L. The northernmost area of the plume, where concentrations are greater than 5 µg/L, is intercepted on-site by Remedial Well 17, and the southernmost downgradient area of concentrations greater than 5 µg/L is separated by the "clean water" front (i.e., TVOC concentrations of less than 5 µg/L) from the northern area at the southern boundary of the Site.
- The deepest portion of the aquifer (basal Magothy) did not exhibit TVOC concentrations in excess of 5 µg/L.

Based on the above findings, it is concluded that the OU2 ONCT system is performing as planned and continues to provide effective horizontal and vertical hydraulic capture of on-site OU2 VOC-impacted groundwater and prevents its off-site migration, including during periods of 2019, when portions of the OU2 ONCT system were shut down for routine and non-routine maintenance (such as basin maintenance and remedial well assessment/rehabilitation efforts).

OU2 ONCT System Capture Analysis

The following OU2 ONCT modeling based capture analysis summary includes an evaluation of the hydraulic effectiveness of the OU2 ONCT system for 2019. For the purposes of this capture analysis, the hydraulic effectiveness of the OU2 ONCT system is defined as its ability to maintain hydraulic control of on-site VOC-impacted groundwater and prevent its off-site migration. More detailed information related to this capture analysis assessment and a complete presentation of associated results is provided in **Appendix C**.

The evaluation included transient flow and solute transport modeling for the 2019 annual period. The results of these analyses were compared to a simulated steady-state hydraulic capture zone model. The modeling effort considered the variability in remedial well extraction rates and South Basin discharge/recharge rates throughout 2019 to determine how these variabilities might have affected the capture and containment of OU2 VOC-impacted groundwater at the Site. Specifically, a portion of the OU2 ONCT system was operating at a reduced capacity in the Third and Fourth Quarters of 2019 while Northrop Grumman implemented a required basin maintenance and remedial well evaluation and rehabilitation maintenance program, as outlined in **Section 3.2**.

Figure 17 depicts several key model layer results, representing the overall area of on-site VOC-impacted groundwater within multiple intervals throughout the aquifer at and upgradient of the OU2 ONCT system. Based on review of the simulated OU2 ONCT system capture zone represented in each model layer in **Figure 17**, the following conclusions are presented:

- Within each model layer, the represented capture zone encompasses the area of on-site OU2 VOC-impacts.
- Each model layer demonstrates that the OU2 ONCT system maintained horizontal and vertical control of on-site OU2 VOC-impacted groundwater during 2019, including during time periods when portions of the OU2 ONCT system were shut down for routine and non-routine maintenance (primarily the basin maintenance and remedial well assessment/rehabilitation efforts).
- The above capture analysis and associated modeling demonstrate that operation of the OU2 ONCT system created an effective hydraulic barrier, meeting its objectives of on-site containment of OU2 VOC-impacted groundwater and preventing its off-site migration.

4.2.5 Groundwater Quality

This section describes and evaluates the analytical results of groundwater quality monitoring completed during 2019.

4.2.5.1 Volatile Organic Compounds

As mentioned above, results of the routine annual and semi-annual monitoring rounds (Second Quarter and Fourth Quarter of 2019) were used to evaluate VOC groundwater quality for this reporting period and are presented on **Tables 10 through 14**. All VOCs were analyzed using USEPA method 8260C and compared to applicable NYSDEC SCGs.

Additionally, time-concentration graphs depicting the long-term VOC concentration trends in key wells with detectable concentrations of VOCs, grouped by proximity to the hydraulic barrier created by operation of the OU2 ONCT system are shown in **Figures 7, 8 and 18 through 20**. The key wells selected to be graphed are representative of overall conditions within the OU2 plume over time, both areally and at depth, and can be considered as surrogates for wells not selected to be graphed.

The following discussion is organized by general area of the Site (upgradient of the ONCT system, proximate to the ONCT system and downgradient of the ONCT system) and by hydrogeologic zone (Shallow/Intermediate, Deep, and Deep2 within each area). Well locations are provided in **Figure 1.**

4.2.5.1.1 Upgradient of the ONCT System

A total of seven Shallow/Intermediate/Deep Zone wells are routinely sampled upgradient of the ONCT System. It should be noted that no wells screened within the Deep2 zone exist upgradient of the ONCT system. Groundwater quality results for wells upgradient of the ONCT System are summarized on **Table 10.** Referenced model layer figures are provided in **Appendix C.**

*Shallow/Intermediate Zone (Model Layers 1-3; **Figure C-9**)*

Of the six Shallow/Intermediate wells upgradient of the ONCT System, only HN-24I exhibited an exceedance of TCE (6.5 ug/L) in 2019; however, well HN-24I shows an overall decreasing TVOC concentration trend since startup of the OU2 ONCT system (**Figure 18**).

*Deep Zone (Model Layers 4-6; **Figures C-9, C-10**)*

On-site well GM-13D exhibited exceedances of TCE (17.6 ug/L) and PCE (38.2 ug/L); however, this well also exhibits an overall downward trend in TVOC concentrations (**Figure 18**), with current concentrations representing a reduction in VOC concentrations of greater than 97% from their highest historical values.

Wells GM-13D and HN-24I, and the remaining five wells without exceedances in the upgradient area, are located within the capture zone of the ONCT system; therefore, groundwater in this area is hydraulically contained and, over time, will be extracted and treated via the continued operation of the OU2 ONCT system. Overall, upgradient monitoring wells currently exhibit a 99.9% decrease in TVOC concentrations from their highest historical values in all hydrogeologic zones (**Table 16**).

4.2.5.1.2 Proximate to ONCT System

A total of 30 monitoring wells screened within the Shallow, Intermediate, Deep, and Deep2 Zones are routinely sampled in proximity to the ONCT System. Groundwater quality results for wells proximate to the ONCT System are summarized on **Table 11**.

*Shallow/Intermediate Zone (Model Layers 1-3; **Figure C-9**)*

A total of 11 Shallow and Intermediate Zone wells are routinely sampled in proximity to the ONCT System and VOCs were not detected at concentrations in exceedance of the SCGs in any of these wells in 2019.

*Deep Zone (Model Layers 4-6; **Figures C-9, C-10**)*

A total of 10 Deep Zone wells are routinely sampled in proximity to the ONCT System. Two out of 10 Deep zone wells in this area exhibited exceedances of the SCG for TCE in 2019; no other wells had SCG exceedances. The wells with exceedances are GM-39DB (ranging from 40.2 ug/L to 43.3 ug/L), and GM-73D (ranging from 7.3 ug/L to 15.4 ug/L). However, it should be noted that these wells exhibited overall reductions in VOC concentrations of greater than 60% and 99%, respectively from their highest historical values (**Table 16**).

*Deep2 Zone (Model Layers 7 – 10; **Figures C-10, C-11**)*

A total of 9 Deep2 Zone wells are routinely sampled in proximity to the ONCT System. Seven of nine Deep2 wells in this area exhibited exceedances of TCE in 2019; including GM-15D2 (ranging from 6.5 ug/L to 6.8 ug/L), GM-21D2 (8.5 ug/L in the Fourth Quarter of 2019), GM-33D2 (ranging from 7.2 ug/L to 11.9 ug/L), GM-73D2 (ranging from 29.6 ug/L to 33.7 ug/L), GM-74D2 (6.7 ug/L), and GM-74D3 (ranging from 5.3 ug/L to 5.9 ug/L). In addition, Well MW-3-1 exhibited exceedances of TCE (ranging from 229 ug/l to 230 ug/L), VC (ranging from 4.5 ug/l to 8.0 ug/L), PCE (ranging from 46.1 ug/l to 57.4 ug/L), and cis-1,2-DCE (ranging from 13.1 ug/l to 19.2 ug/L).

Wells located in proximity to the ONCT system continue to show an overall decreasing trend in TVOC concentrations since startup of the system (**Figure 8**), as these wells are located within the capture zone of the ONCT system. Therefore, groundwater in this area is hydraulically contained and, over time, will be extracted and treated via the continued operation of the OU2 ONCT system. Additionally, this group of wells shows a collective decrease in TVOC concentrations of nearly 98% from their highest historical values in all hydrogeologic zones (**Table 16**).

4.2.5.1.3 Downgradient of the ONCT System

A total of 15 monitoring wells and the 15 former Navy outpost wells are routinely sampled downgradient of the ONCT system. Groundwater quality results for wells downgradient of the ONCT System are summarized on **Table 12**.

*Shallow/Intermediate Zone (Model Layers 1-3; **Figure C-9**)*

It should be noted that, given that the mass of TVOCs exists within deeper zones of the aquifer, there are no wells that are routinely monitored in the Shallow Zone downgradient of the ONCT system. Three wells are screened in the Intermediate Zone downgradient of the ONCT System. No intermediate wells exhibited exceedances of VOCs in 2019.

*Deep Zone (Model Layers 4-6; **Figures C-9, C-10**)*

A total of 11 Deep Zone monitoring wells are routinely sampled downgradient of the ONCT System. In 2019, five of 11 wells in this area exhibited exceedances, as follows:

- GM-34D exhibited TCE at concentrations ranging from 159 ug/L to 186 ug/L; PCE at concentrations ranging from 5.9 ug/L to 6.8 ug/L; and cis-1,2-DCE at a concentration of 6.1 ug/L.
- GM-37D exhibited TCE at a concentration of 10.7 ug/L.
- GM-38D exhibited TCE at concentrations ranging from 104 ug/L to 119 ug/L.
- GM-70D2 exhibited TCE at concentrations ranging from 6.6 ug/L to 10.9 ug/L.
- GM-79D exhibited TCE at concentrations ranging from 15.8 ug/L to 20.5 ug/L.

However, it should be noted that these wells exhibited overall reductions in VOC concentrations of greater than 85%, 73%, 93%, 97% and 86%, respectively from their highest historical values (**Table 16**).

*Deep2 Zone (Model Layers 7 – 10; **Figures C-10, C-11**)*

A total of 16 Deep2 Zone monitoring wells are routinely sampled downgradient of the ONCT System.

In 2019, five monitoring wells in this area exhibited exceedances, as follows:

- GM-34D2 exhibited TCE at concentrations ranging from 76.2 ug/L to 95.7 ug/L; and PCE at a concentration of 6.3 ug/L.
- GM-35D2 exhibited TCE at concentrations ranging from 21.3 ug/L to 24.9 ug/l.
- GM-38D2 exhibited TCE at concentrations ranging from 11.8 ug/L to 21.9 ug/L; and 1,1-DCA at a concentration of 5.2 ug/L.
- GM-71D2 exhibited TCE at a concentration of 10.9 ug/L.
- GM-75D2 exhibited TCE at concentrations ranging from 15.8 ug/L to 20.4 ug/L.

Three of the former Navy outpost wells also exhibited exceedances in 2019, bringing the total number of wells with SCG exceedances for VOCs in downgradient Deep2 wells to eight. The former Navy outpost well exceedances are discussed further below (in subsection Former Outpost Well Monitoring).

An overall downward or stabilizing trend in VOC concentrations over time exists for wells in this area (**Figures 19, 20, 21**). **Figure 19** highlights the downward trend in TVOC concentrations in representative downgradient Northrop Grumman monitoring wells (GM-35D2, GM-36D2, GM-37D, GM-70D2, GM-75D2,) observed since startup of the OU2 ONCT system. This decreasing trend is generally representative of overall TVOC trends downgradient of the ONCT system. Additionally, downgradient monitoring wells shows a collective decrease in TVOC concentrations of nearly 92% from their highest historical values for all hydrogeologic zones (**Table 16**). Data for the RE126 well cluster, provided by the Navy, is included in **Figure 19** to supplement the evaluation because of RE126 well cluster's proximity to the bifurcation of the VOC plume.

GM-38 Area

As previously reported, Navy operates an off-site groundwater extraction and treatment system at the GM-38 hotspot area located downgradient and approximately 0.75 miles southeast of the Site. OM&M reports for the GM-38 Area Remedy are submitted to NYSDEC by the Navy under separate cover; however, Arcadis also reviews these reports to supplement our evaluation of off-site groundwater conditions downgradient of the OU2 ONCT system. As such, a brief summary of the GM-38 Area Remedy is provided below.

In 2019, the GM-38 Area Remedy recovery well flowrates were adjusted to approximately 800 gpm for RW-1 and 300 gpm for RW-3 during the First and Second Quarters 2019 and were maintained at those rates through at least the Third Quarter of 2019 (KGS Government Solutions 2019). Treated effluent samples collected from RW-1 and RW-3 are routinely sampled for VOCs and were also analyzed for 1,4-dioxane. Effluent samples exhibited 1,4-dioxane results consistent with samples collected from monitoring wells GM-38D and GM-38D2, all of which were below 4.0 ug/L in 2019 (**Table 14**).

As outlined above, during 2019, GM-38D exhibited SCG groundwater exceedances for TCE (104 ug/L to 119 ug/L), and GM-38D2 exhibited SCG groundwater exceedances for TCE (11.8 ug/L to 21.9 ug/L) and 1,1-DCA (5.2 ug/L). These results were consistent with VOC data from previous quarters.

Figure 20 depicts TVOC trends for Deep and Deep2 zone wells in the GM-38 Area. The TVOC concentrations in off-site wells GM-38D and GM-38D2 have decreased since mid-2006 and 2002, respectively, with the exception of a temporary increase in TVOCs observed in GM-38D2 in late 2015. This increase occurred after Navy shut-down of GM-38 Area Remedy's RW-3 from July 2015 to June 2018 and increased RW-1's pumping rate from 800 gpm to 1000 gpm (H&S Environmental, 2018). Most recently throughout 2019, TVOC concentrations appear to be stable in well GM-38D and slightly declining in well GM-38D2.

Former Outpost Well Monitoring

Fifteen former Navy outpost monitoring wells were repurposed at the end of 2015 as OU2 plume monitoring wells; however, they also continue to serve to monitor the VOC plume upgradient of certain public supply wellfields. Outpost monitoring wells continue to be sampled for VOCs using USEPA Method 524.2 and for 1,4-dioxane using USEPA Method 522, for comparison to data collected from nearby

drinking water supply wells. Well cluster BPOW 1 is utilized to monitor wellfield 1 for the South Farmingdale Water District; well cluster BPOW 2 is utilized to monitor wellfield 3 for the South Farmingdale Water District; well cluster BPOW 3 is utilized to monitor New York American Water's Seaman's Neck wellfield; and well cluster BPOW 4 is utilized to monitor well N-5303 for the Town of Hempstead/Levittown Water District.

As summarized on **Table 12**, only three of 15 former outpost wells in the Deep and Deep2 Zones exhibited VOC exceedances in 2019. Outpost monitoring well BPOW 3-4 exhibited TCE at concentrations ranging from 154 ug/L to 161 ug/L. Outpost monitoring well BPOW 4-1R exhibited Freon 113 at concentrations ranging from 24.6 ug/L to 30.7 ug/L. Outpost monitoring well BPOW 4-2R exhibited Freon 113 at concentrations ranging from 6.7 ug/L to 18.8 ug/L.

Figure 21 highlights the historical downward or stabilizing trend in TVOC concentrations for the BPOW 1 cluster, and **Figure 22** shows the increasing trends for outpost wells BPOW3-4, BPOW4-1R, and BPOW 4-2R. It should also be noted that well cluster BPOW 2 has not exhibited exceedances of the SCGs since 2007.

4.2.5.5 Cadmium and Chromium

Representative wells located in proximity to former Northrop Grumman Plants 1 and 2 are sampled for laboratory analysis of total and dissolved cadmium (Plant 1 only) and chromium (Plants 1 and 2). Analytical results for the Second and Fourth Quarters of 2019 are provided on **Table 13**. As a "worst-case" conservative approach, only total (unfiltered) metals concentrations are discussed below and depicted on the corresponding figures. Trends in total cadmium concentrations near former Northrop Grumman Plant 2 are shown in **Figure 23**. Trends in total chromium concentrations near former Northrop Grumman Plants 2 and 1 are shown in **Figures 24 and 25**, respectively. Results are summarized as follows:

Former Northrop Grumman Plant 1

Exceedance of total chromium were detected in three of four wells associated with Plant 1 during 2019. Total chromium was detected at concentrations ranging from 106 ug/L to 779 ug/l. The greatest total chromium concentration was detected in the Fourth Quarter of 2019 in monitoring well PLT1 MW-05, located on the southeastern side of former Northrop Grumman Plant 1.

As depicted in **Figure 25**, total chromium in well PLT1MW-05 is increasing since 2017, but well below the highs of 2005. In addition, well PLT1MW-06 shows a continuing steady reduction in concentration since the beginning of record, and Well GM-15SR is exhibiting a decreasing trend since 2010. There have been no detections of total chromium in Well PLT1 MW-04 since mid-2005.

Former Northrop Grumman Plant 2

An exceedance of total cadmium SCG was only detected in one of five wells associated with Plant 2 during 2019: N-10631 exhibited a total cadmium concentration of 8.3 ug/L during the Second Quarter of 2019, which was similar to concentrations detected in 2018, as shown in **Figure 23**.

Exceedance of total chromium SCG were detected in two of five wells associated with Plant 2 during 2019. Total chromium was detected at concentrations ranging from 54.1 ug/L to 290 ug/l. The greatest total chromium concentration was detected in the Second Quarter of 2019 in monitoring well MW-02GF, located on the south side of former Northrop Grumman Plant 2. As depicted in **Figure 24**, monitoring well MW-02GF has shown variable concentrations for the period of record, including some results above the SCG prior to 2013, concentrations below the SCG from 2013 through 2017, and most recently increasing to concentrations above the SCG in 2018 and 2019.

4.2.5.6 Tentatively Identified Compounds

Consistent with previous Annual Groundwater Monitoring Reports, this section summarizes Tentatively Identified Compounds (TICs). In the Second Quarter of 2019, one unknown TIC was detected in outpost wells BPOW1-1, BPOW1-2, BPOW1-3, and monitoring well GM-35D2. In the Third Quarter of 2019, one unknown TIC was detected in outpost well BPOW2-3. In the Fourth Quarter of 2019, one unknown TIC was detected in outpost well BPOW1-2, and in monitoring wells GM-17I, GM-17D, GM-73D, GM-73D2, and GM-73D3. One unknown TIC was detected in Remedial Well 1 and Remedial Well 3R in the Second Quarter of 2019, and one unknown TIC was detected in Tower 96 effluent in the Fourth Quarter of 2019.

4.2.5.7 1,4-Dioxane

As per the NYSDEC's conditional approval of the June 2015 Groundwater Monitoring Plan Addendum (NYSDEC 2015b), 1,4-dioxane was added as an analyte for all remedial, monitoring, and outpost wells sampled under the OU2 groundwater monitoring program. As outlined in **Section 4.1**, 1,4-dioxane was analyzed using USEPA Method 8270D SIM CLLE for all monitoring wells, while samples collected from outpost wells continue to be analyzed using USEPA Method 522 (see **Section 4.2.5.1.3**). The results of 1,4-dioxane analysis of groundwater samples obtained from all four quarters of sampling in 2019 are provided on **Table 14**, organized by hydrogeologic zone.

Out of a total of 158 samples collected in 2019 from former outpost wells, monitoring wells, and remedial wells, including replicates, 25 samples were non-detect. Detected concentrations ranged from 0.087 µg/L to 15 µg/L. The highest concentrations generally occur in the vicinity of the ONCT remedial wells.

4.2.5.8 Vinyl Chloride

VC is routinely detected in Remedial Well 3R and adjacent monitoring well MW-3-1, which are both located in the northwestern portion of the Site. VC was detected in quarterly influent samples at Remedial Well 3R at concentrations ranging from 1.1 µg/L to 1.7 µg/L in 2019, while groundwater samples collected from monitoring well MW-3-1 exhibited VC concentrations ranging from 4.5 µg/L to 8.0 µg/L in 2019. Groundwater remediation (i.e., biosparge system) to address VC upgradient (northwest) of Remedial Well 3R and Monitoring Well MW 3-1 is currently underway by OXY under USEPA oversight.

4.2.5.9 QA/QC Samples and Data Validation

Arcadis performed validation of treatment system vapor and water samples, and groundwater quality data in accordance with the updated GWMP (Arcadis 2016c) and by following the contract laboratory program

and by applying relevant NYSDEC and USEPA protocols. The quality of the data is considered acceptable with the qualifiers indicated on **Tables 4, 5A/B/C/D, 7 and 10 through 15**.

5 CONCLUSIONS

The following conclusions are provided regarding the performance and ability of the OU2 ONCT system to achieve the RAOs for the Site for the 2019 reporting period:

- The ONCT system is operating as designed and hydraulic containment of the on-site portion of the VOC-impacted groundwater continues.
- The operation of the ONCT system complied with applicable NYSDEC SCGs for OU2 ONCT system emissions (i.e., treated water and air emissions).
- The capture zone created via operation of the OU2 ONCT system encompasses the area of on-site OU2 VOC-impacts.
- The results of the hydraulic effectiveness program described in **Section 4.2.4** demonstrate that the OU2 ONCT system maintained horizontal and vertical control of on-site OU2 VOC-impacted groundwater during 2019 (including during time periods when portions of the OU2 ONCT system were shut down for routine and non-routine maintenance such as basin maintenance and remedial well assessment/rehabilitation efforts) via extraction of on-site OU2 VOC-impacted groundwater and discharge/recharge of treated water to the South Basins.
- The groundwater quality data from wells immediately downgradient of the hydraulic barrier at the southern boundary of the Site have continue to exhibit downward TVOC concentration trends over time, as expected due to the continued effectiveness, performance and compliance of the OU2 ONCT system.
- Groundwater quality data indicates that bifurcation of the VOC plume is continuing in the Deep, Deep2 Zones south of the hydraulic barrier at the southern boundary of the Site.
- As operation of the OU2 ONCT system continues over time, bifurcation of TVOC-impacted groundwater, and an associated "clean water" front, will continue to develop downgradient of the ONCT system as on-site VOC-impacted groundwater continues to be removed from the aquifer by pumping the remedial wells and treated water continues to be discharged/recharged at the South Basins.
- Operation of the OU2 ONCT system creates an effective hydraulic barrier, meeting its objectives of on-site containment of OU2 VOC-impacted groundwater and preventing its off-site migration.
- Since late 2010, the chromium concentration trends in PLT1MW-06, PLTMW-05 and GM-15SR near the former Northrop Grumman Plant 1 have been stable. In 2019, chromium concentrations in well PLT1 MW-05 (in the vicinity of Plant 1) and MW-02GF (in the vicinity of Plant 2) remain elevated above the SCG; though, these 2019 concentrations were within range of previous concentrations.

6 SUGGESTIONS FOR CONTINUED MONITORING

Based on the findings and conclusions presented herein, the following suggestions are provided with respect to continued operation and monitoring of the ONCT system for effectiveness:

- The OU2 ONCT system should continue to be operated to meet remedial objectives and maintain the clean waterfront created by the system.
- Remedial system monitoring and well monitoring programs should generally continue at previously specified frequencies to ensure the OU2 ONCT system is operating efficiently and effectively.

  However, it should be noted that previously completed supplemental quarterly sampling efforts at monitoring wells GM-21D2, GM-20D, GM-33D2 and GM-75D2, which are located just south of the ONCT remedial wells, have demonstrated that TVOC trends in these wells are generally consistent with past concentrations, levels are trending downward and there are no significant or sustained trend deviations. Graphs demonstrating these continued downward TVOC trends are provided in **Appendix F**. As such, Arcadis suggests that continued supplemental quarterly sampling of these wells is no longer necessary. Sampling of these wells is therefore suggested to be completed at the sampling frequencies most recently proposed in the 2018 Annual OMM Report for OU2 and per Navy's ongoing routine sampling program frequencies: quarterly sampling of GM-21D2; semiannual sampling of GM-75D2 and GM-33D2; and annual sampling of GM-20D.

  In addition, Arcadis suggests that the sampling frequency for other groundwater monitoring wells proposed in the 2018 Annual Report be implemented 2020, pending NYSDEC approval.
- Continue to enhance hydraulic and groundwater quality monitoring in the vicinity of the ONCT system by incorporating data obtained from Navy for monitoring well clusters RE-123, RE-126, and additionally, RE-109.

7 CERTIFICATION STATEMENT

For each institutional or engineering control identified for the OU2 On-Site Groundwater Remedy, I certify that all of the following statements are true:

a. The engineering control employed for the OU2 On-Site Groundwater Remedy is unchanged from the date the control was put in place, or last approved by New York State Department of Environmental Conservation Division of Environmental Remediation (DER).

b. Nothing has occurred that would impair the ability of such control to protect public health and the environment.

c. Nothing has occurred that would constitute a violation or failure to comply with any operation, maintenance, and monitoring plan for this control.

d. Access to the OU2 On-Site Groundwater Remedy will continue to be provided to DER to evaluate the remedy, including access to evaluate the continued maintenance of this control.

Christopher Engler, P.E.
Engineer of Record
New York License # 069748

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TABLES

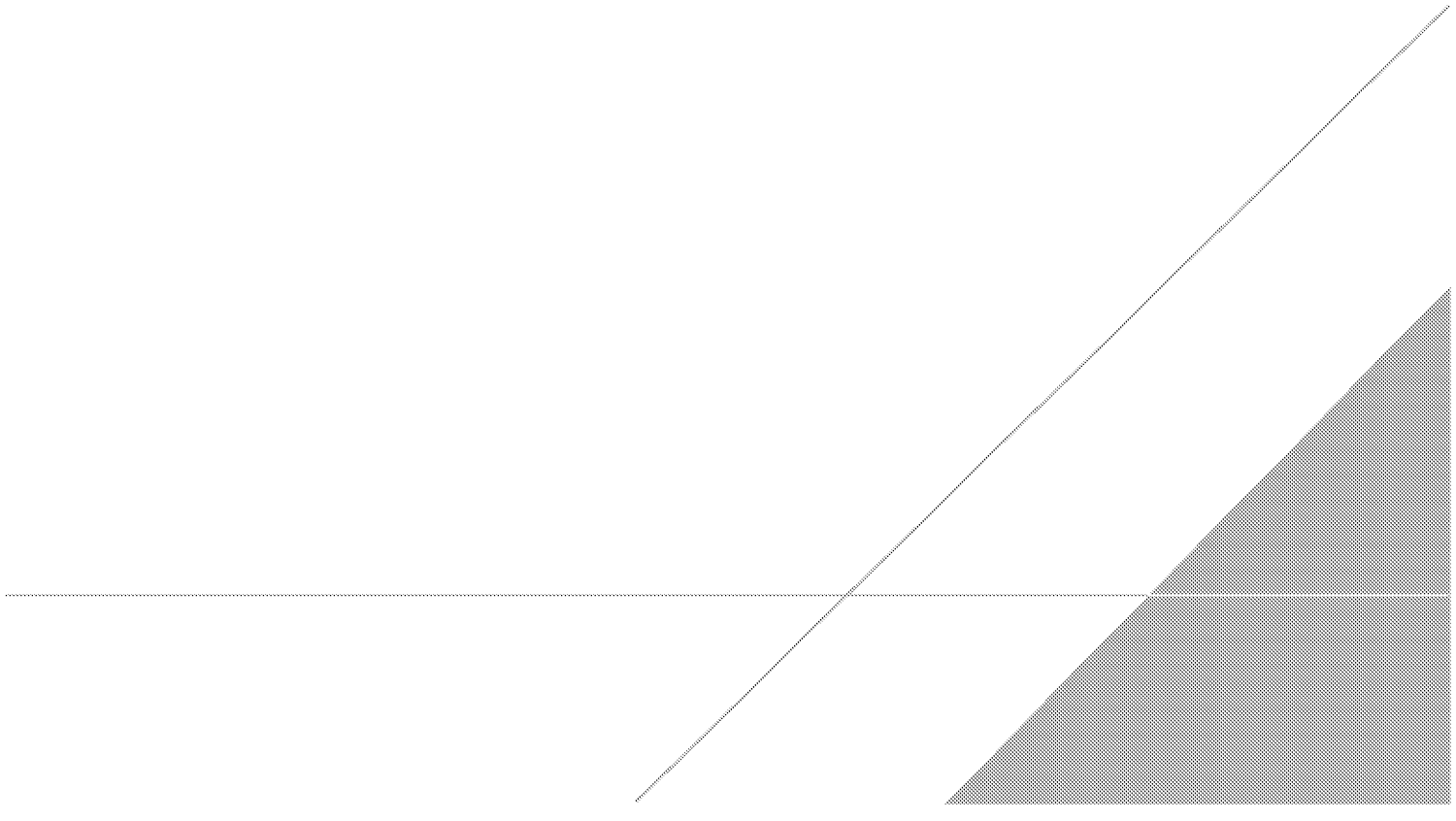

Table 1A
Summary of Weekly Monitoring Data for 2019[1,2],
Operable Unit 2, Tower 96 Treatment System,
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Date	WELL 1					WELL 3R					AIR STRIPPER			
	Extracted Groundwater			VFD		Extracted Groundwater			VFD		Influent Water Flow			Ambient Influent Air Temperature
	Flow Rate (gpm)	Totalizer (x1000) (gal)	Pressure (psig)	Frequency (Hz)	Amperage (Amps)	Flow Rate (gpm)	Totalizer (x1000) (gal)	Pressure (psig)	Frequency (Hz)	Amperage (Amps)	Flow Recorder Rate (gpm)	Flow Meter Rate (gpm)	Totalizer (x100) (gal)	(°F)
1/10/2019	704	1,508,560	40	45.16	91.5	716	866,791	29	44.94	76.4	1,488	1,467	2,276,680	37
2/13/2019	718	1,543,247	42	46.25	92.5	718	901,880	30	44.94	76.5	1,473	1,472	2,994,956	60
3/12/2019	687	1,570,717	41	45.07	91.9	718	929,511	30	45.07	76.8	1,451	1,442	3,559,130	58
4/2/2019	778	1,592,562	44	48.13	96.2	719	951,319	30	44.99	76.5	1,542	1,543	4,003,172	58
5/29/2019	874	1,659,944[3]	51	53.30	107.3	719	1,010,169	30	45.20	77.2	1,701	1,684	5,327,744	60
6/25/2019	809	1,688,435	45	46.10	98.2	718	1,038,132	30	45.03	77.0	1,561	1,558	5,957,568	70
7/26/2019	742	1,718,983[4]	42	46.60	85.3	716	1,065,867	30	44.30	74.8	1,507	1,524	6,569,337	70
8/6/2019	808	1,730,601	44	46.64	85.2	720	1,077,120	30	44.30	75.0	1,521	1,505	6,803,591	70
9/4/2019	756	1,760,581[5]	42	46.41	84.5	718	1,105,766[6]	30	44.38	75.2	1,495	1,484	7,408,394	80
10/15/2019[15]	802	1,786,961	39	45.48	83.0	0	1,125,689[7]	0	0.00	0	766	762	7,859,078	47
11/19/2019 [15]	948	1,834,558	48	52.38	100.0	0	1,125,689[7]	0	0.00	0	950	946	8,331,020	40
12/23/2019	805	1,879,553	42	46.28	84.0	718	1,135,823	29	44.06	75.2	1,500	1,486	8,886,215	40

See Notes and Abbreviations on last page.

Table 1A
Summary of Weekly Monitoring Data for 2019[1,2],
Operable Unit 2, Tower 96 Treatment System,
Northrop Grumman Systems Corporation,
Bethpage, New York

Date	HEAT EXCHANGER		PROCESS BLOWER				CONDENSER		
							Condenser Cooling Water		
	Air Inlet Pressure (iwc)	Steam Inlet Pressure (psig)	Air Inlet Vacuum (iwc)	Air Effluent Temperature (°F)	Air Effluent Pressure (iwc)	Calculated Blower Static Pressure (iwc)	Influent Temperature (°F)	Effluent Temperature (°F)	Temperature Differential (°F)
1/10/2019	3.5	15	4.8	88	2.0	2.8	53	90	37
2/13/2019	5.1	16	4.9	88	1.6	3.3	60[8]	95[8]	35
3/12/2019	4.9	16	4.9	90	1.6	3.3	55[9]	85[9]	30
4/2/2019	5.1	16	5.1	90	1.8	3.3	52[10]	72[10]	20
5/29/2019	5.2	16	5.0	90	1.6	3.4	56[11]	80[11]	24
6/25/2019	6.0	15	5.2	87	1.6	3.6	56	82	26
7/26/2019	4.4	15	4.4	98	1.8	2.6	56[12]	86[12]	30
8/6/2019	6.0	15	4.9	94	1.5	3.4	56	81	25
9/4/2019	4.9	14.5	6.0	97	3.7	2.3	56	82	26
10/15/2019	6.0	15	5.0	90	1.5	3.5	56	83	27
11/19/2019	4.4	15	4.3	90	1.6	2.7	56	82	26
12/23/2019	6.0	14	5.0	90	1.6	3.4	56	82	26

See Notes and Abbreviations on last page.

Table 1A
Summary of Weekly Monitoring Data for 2019[1,2],
Operable Unit 2, Tower 96 Treatment System,
Northrop Grumman Systems Corporation,
Bethpage, New York

Date	SEPARATOR		AIR COMPRESSOR	SUPPLEMENTAL AIR TREATMENT SYSTEM		WEST RECHARGE BASINS			
	Condensed Steam Water			Influent Blower	Total System Effluent	North		South	
	Separator Temperature (°F)	Separator Vent Temperature (°F)	Delivery Pressure (psig)	Pressure (iwc)	Pressure (iwc)	Basin Water Height (ft)	Status[14] (On/Off)	Basin Water Height (ft)	Status[14] (On/Off)
1/10/2019	82	105	100	-1.2	5.5	10.0	NR	4.5	NR
2/13/2019	90	99	86	-2.5	5.0	10.6	NR	5.6	NR
3/12/2019	90	96	86	-2.5	5.0	10.5	NR	6.0	NR
4/2/2019	90	98	86	-2.5	5.0	9.0	NR	3.0	NR
5/29/2019	90	98	86	-2.5	5.0	7.0	On	2.0	On
6/25/2019	90	96	87	-2.5	5.0	0	Off	3.0	On
7/26/2019	95	97	86	-2.4	5.1	0	Off	0.5	On
8/6/2019	92	98	86	-2.5	5.0	0	Off	8.6	On
9/4/2019	86	110	116	-2.5	5.0	0	Off	6.5	On
10/15/2019	92	99	98	-2.5	5.0	1.0	On	1.0	On
11/19/2019	90	100	98	-2.5	5.0	1.0	On	2.0	On
12/23/2019	90	100	97	-2.5	5.0	0.5	On	2.8	On

See Notes and Abbreviations on last page.

Table 1A
Summary of Weekly Monitoring Data for 2019[1,2],
Operable Unit 2, Tower 96 Treatment System,
Northrop Grumman Systems Corporation,
Bethpage, New York

Date	REGENERATIVE VAPOR PHASE TREATMENT UNITS								
	Adsorb				Desorb				
	Flow (cfm)	Pressure (iwc)	Temperature (°F)	Flow (scfm)	Desorb Bed (A/B)	Time into cycle (min)	Influent Steam Pressure (psig)	Effluent Steam Temperature (°F)	Effluent Temperature (°F)
1/10/2019	4,930	1.4	81	4,846	A	57	15[13]	203[13]	86[13]
2/13/2019	4,880	1.1	85	4,758	A	58	17	208	89
3/12/2019	4,800	0.4	87	4,655	B	31	16	212	88
4/2/2019	4,780	0.4	87	4,636	B	37	16	212	86
5/29/2019	4,950	0.4	86	4,809	B	49	16	219	90
6/25/2019	4,890	0.4	87	4,743	A	56	16	215	88
7/26/2019	4,660	0.3	86	4,527	A	43	15	216	90
8/6/2019	4,840	0.4	86	4,703	B	62	15	216	90
9/4/2019	4,880	0.7	94	4,677	A	45	11	181	95
10/15/2019	4,890	0.4	87	4,742	A	68	15	214	89
11/19/2019	4,960	0.4	87	4,811	A	45	13	210	89
12/23/2019	4,710	0.4	87	4,568	A	57	14	216	90

See Notes and Abbreviations on last page.

Table 1A
Summary of Weekly Monitoring Data for 2019[1,2],
Operable Unit 2, Tower 96 Treatment System,
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Notes and Abbreviations:

(1) Operational data collected weekly by Northrop Grumman and supplemented by monthly Arcadis measurements. For clarity, data shown is representative of monthly conditions collected during a single weekly Northrop Grumman site visit or monthly Arcadis visit.
(2) Instantaneous values from field-mounted instruments, except otherwise noted.
(3) Well 1 Totalizer reading calculated due to flow totalizer replacement on April 15, 2019. Flow volumes were estimated using data from the monthly SPDES evaluations.
(4) Well 1 Totalizer reading calculated due to flow totalizer replacement between July 9, 2019 and July 26, 2019. Flow volumes were estimated using data from the monthly SPDES evaluations.
(5) Well 1 Totalizer reading calculated due to flow totalizer replacement on August 30, 2019. Flow volumes were estimated using data from the monthly SPDES evaluations.
(6) Well 3R Totalizer value was taken from September 4, 2019 due to typographical error during data entry.
(7) Well 3R Totalizer readings were not recorded during system shutdown, values shown are from the November 5, 2019 event.
(8) Condenser cooling water temperature readings were not recorded on this date, values shown are from the February 13, 2019 event.
(9) Condenser cooling water temperature reading was not recorded on this date, value shown is from the March 13, 2019 event.
(10) Condenser cooling water temperature reading was not recorded on this date, value shown is from the April 2, 2019 event.
(11) Condenser cooling water temperature reading was not recorded on this date, value shown is from the May 21, 2019 event.
(12) Condenser cooling water temperature reading was not recorded on this date, value shown is from the July 30, 2019 event.
(13) RVPGAC desorb readings were not fully recorded on this date, values shown are from the January 15, 2019 event.
(14) Status indicates if the basin was accepting water (on) or not accepting water (off).
(15) Well 3R was shut down from October 10 to December 13, 2019 for a scheduled well rehabilitation effort.

°F	degrees Fahrenheit
Amps	amperes
cfm	cubic feet per minute
ft	feet
gal	gallons
gpm	gallons per minute
Hz	hertz
iwc	inches of water column
min	minutes
psig	pounds per square inch, gauge
scfm	standard cubic feet per minute
NA	Not Available
NC	Not Calculated
NR	Not Recorded
RVPGAC	Regenerative Vapor Phase Granular Activated Carbon
SCADA	Supervisory Control and Data Acquisition
SPDES	State Pollutant Discharge Elimination System
VFD	Variable Frequency Drive

Table 1B
Summary of Weekly Monitoring Data for 2019[1,2],
Operable Unit 2, Tower 102 Treatment System,
Northrop Grumman Systems Corporation,
Bethpage, New York

Date	WELL 17					WELL 18					WELL 19				
	Extracted Groundwater				VFD	Extracted Groundwater				VFD	Extracted Groundwater				VFD
	Flow Recorder Rate (gpm)	Flow Meter Rate (gpm)	Totalizer (x1000) (gal)	Pressure (psig)	Frequency (Hz)	Flow Recorder Rate (gpm)	Flow Meter Rate (gpm)	Totalizer (x1000) (gal)	Pressure (psig)	Frequency (Hz)	Flow Recorder Rate (gpm)	Flow Meter Rate (gpm)	Totalizer (x1000) (gal)	Pressure (psig)	Frequency (Hz)
1/10/2019	1,002	1,001	1,983,975	54	51.0	817	821	1,254,022	59	46.9	511	513	313,704	50	42.5
2/13/2019	1,005	1,000	2,032,740	55	51.0	818	821	1,293,898	59	46.8	508	514	338,566	60	42.3
3/12/2019	1,004	1,003	2,071,253	56	50.9	818	820	1,325,310	59	46.8	513	515	358,345	50	42.3
4/2/2019	1,000	998	2,096,746	56	51.0	818	820	1,350,089	59	46.8	516	514	373,795	50	42.5
5/29/2019	1,004	1,003	2,173,611	55	50.7	800	822	1,413,528	59	46.7	514	514	413,884	50	42.3
6/25/2019	1,001	1,000	2,212,774	56	50.8	798	820	1,444,706	59	46.6	510	511	433,871	50	42.3
7/26/2019	0[4]	0[4]	NR[4]	0[4]	0[4]	1,080	1,113	1,482,761	59	54.0	994	996	458,940	48	51.8
8/6/2019	1,001	1,000	2,259,826	56	50.9	798	821	1,494,701	59	46.7	512	512	470,501	50	42.3
9/4/2019	1,000	1,001	2,301,464	65	50.7	798	823	1,530,583	58	46.6	513	514	491,771	58	42.3
10/15/2019	1,002	1,000	2,360,630	64	50.9	798	820	1,577,491	59	46.7	512	512	520,585	50	42.3
11/19/2019	1,097	1,096	2,415,617	70	54.4	993	1,022	1,627,214	65	52.8	514	514	546,441	56	43.5
12/23/2019	1,100	1,098	2,443,830	70	54.4	995	1,019	1,656,910	65	52.8	513	515	561,977	56	43.5

See Notes and Abbreviations on last page.

Table 1B
Summary of Weekly Monitoring Data for 2019[1,2],
Operable Unit 2, Tower 102 Treatment System,
Northrop Grumman Systems Corporation,
Bethpage, New York

Date	AIR STRIPPER						HEAT EXCHANGER			
	Influent Water Flow					Ambient Influent Air Temperature				
	Flow Recorder Rate (gpm)	Flow Meter Rate (gpm)	Totalizer (x1000) (gal)	Influent Water Temperature (°F)	Influent Water Pressure (psig)	(°F)	Air Inlet Temperature (°F)	Steam Inlet Pressure (psig)	Air Outlet Temperature (°F)	Calculated Temperature Differential (°F)
1/10/2019	2,280	2,379	55,264,076	59	29.5	35	60	15	80	20
2/13/2019	2,283	2,376	56,373,943	59	29.0	37	59	14	80	21
3/12/2019	2,285	2,287	57,255,994	59	30.0	60	60	15	80	20
4/2/2019	2,283	2,282	57,897,261	59	30.0	58	60	15	80	20
5/29/2019	2,302	2,280	59,657,827	60	30.0	60	60	16	80	20
6/25/2019	2,296	2,270	60,552,449	59	30.0	61	60	15[6]	80	20
7/26/2019	2,103	2,180	61,570,465	59	29.0	68	60	15	80	20
8/6/2019	2,310	2,387	61,919,243	59	30.0	70	60	15	80	20
9/4/2019	2,295	2,371	62,886,166	60	29.5	80	60	15	81	21
10/15/2019	2,304	2,380	64,223,488	59	30.0	60	60	15[7]	80	20
11/19/2019	2,603	2,673	65,522,261	59	30.0	59	60	15	80	20
12/23/2019	2,604	2,669	66,313,966	60[5]	30.0	59	60	15	80	20

See Notes and Abbreviations on last page.

Table 1B
Summary of Weekly Monitoring Data for 2019[1,2],
Operable Unit 2, Tower 102 Treatment System,
Northrop Grumman Systems Corporation,
Bethpage, New York

Date	PROCESS BLOWER TO RVPGAC TREATMENT UNITS				CONDENSER				AIR COMPRESSOR
					Cooling Water			Condensed Steam Water	
	Blower Influent Pressure	VIV Position	Blower Effluent Pressure	Calculated Blower Static Pressure	Influent Temperature[3]	Effluent Temperature	Calculated Temperature Increase	Decanter Vent Temperature	Delivery Pressure
	(iwc)	(% open)	(iwc)	(iwc)	(°F)	(°F)	(°F)	(°F)	(psig)
1/10/2019	7.7	50	20.0	12.3	57	76	19	125	90
2/13/2019	7.7	60	20.0	12.3	58	77	19	95	95
3/12/2019	7.6	60	20.0	12.4	59	82	23	92	102
4/2/2019	7.6	60	21.0	13.4	59	82	23	87	105
5/29/2019	7.4	70	20.0	12.6	60	87	27	99	100
6/25/2019	7.4	65	20.0	12.6	59	91	32	97	108
7/26/2019	7.4	65	21.0	13.6	59	81	22	97	98
8/6/2019	7.5	65	21.0	13.5	60	88	28	93	114
9/4/2019	7.4	60	21.0	13.6	65	89	24	91	100
10/15/2019	7.8	65	21.0	13.2	59	88	29	92	111
11/19/2019	7.8	65	21.0	13.2	59	85	26	94	112
12/23/2019	8.0	65	21.0	13.0	59	84	25	83	108

See Notes and Abbreviations on last page.

Table 1B
Summary of Weekly Monitoring Data for 2019[1,2],
Operable Unit 2, Tower 102 Treatment System,
Northrop Grumman Systems Corporation,
Bethpage, New York

Date	T102 VAPOR DISCHARGE		T102 WEIR		FORCE MAIN	REGENERATIVE VAPOR PHASE TREATMENT UNITS					
	Effluent Treated Vapor		Effluent Treated Groundwater			Desorb					
	Flow (cfm)	Temperature (°F)	Flow Meter Rate (gpm)	Totalizer[f] (x1000) (gal)	Distribution System Pressure (psig)	Desorb Bed (A/B)	Time into Cycle (min)	Influent Steam Pressure (psig)	Influent Steam Temperature (°F)	Desorb Bed Temperature (°F)	Effluent Steam Temperature (°F)
1/10/2019	7,800	75	1,279	763,577	63.8	A[9]	118[9]	3.2[9]	240[9]	172[9]	201[9]
2/13/2019	8,050	80	1,140	819,108	63.3	A[10]	106[10]	3.2[10]	243[10]	168[10]	201[10]
3/12/2019	7,800	82	1,167	862,368	63.7	B	104	3.3	233	160	201
4/2/2019	7,870	81	2,309	898,058	56.0	A	87	3.2	242	172	202
5/29/2019	7,140	84	3,182	1,072,294	43.5	B	62	3.3	251	160	202
6/25/2019	7,770	89	3,747	1,196,652	43.6	B	130	3.5	246	165	202
7/26/2019	7,785	88	3,851	1,324,330	43.6	A	83	3.2	244	180	201
8/6/2019	7,710	88	2,784	1,364,871	61.6	A	75	3.5	246	192	202
9/4/2019	7,700	87	2,807	1,479,263	59.0	B[11]	60[11]	3.4[11]	247[11]	168[11]	202[11]
10/15/2019	7,770	91	1,854	1,594,855	60.5	B	129	3.5	246	178	201
11/19/2019	7,720	86	612[12]	1,726,175	60.5	B	107	3.1	247	172	201
12/23/2019	7,720	90	0	1,793,598	59.0	A	50	3.2	246	195	202

See Notes and Abbreviations on last page.

Table 1B
Summary of Weekly Monitoring Data for 2019[1,2],
Operable Unit 2, Tower 102 Treatment System,
Northrop Grumman Systems Corporation,
Bethpage, New York

Notes and Abbreviations:

(1) Operational data collected weekly by Northrop Grumman and supplemented by monthly Arcadis measurements. For clarity, data shown is representative of monthly conditions collected during a single weekly Northrop Grumman site visit or monthly Arcadis visit.
(2) Instantaneous values from field-mounted instruments, except otherwise noted.
(3) Measurement taken with Infrared temperature gun.
(4) Well 17 of the Tower 102 System was shut down from July 22 to July 31, 2019 for a scheduled well inspection. During this offline period, Well 18 flow rate was increased to 1,000 gpm to maintain plume capture.
(5) Air stripper influent water temperature reading was not recorded on this date, value shown is from the December 27, 2019 event.
(6) Heat exchanger steam inlet pressure reading was not recorded on this date, value shown is from the June 18, 2019 event.
(7) Heat exchanger steam inlet pressure reading was not recorded on this date, value shown is from the October 22, 2019 event.
(8) From June 12, 2019 to December 18, 2019, the weir flow element for the South Recharge Basins was damaged. Thus, South Basin flow data were estimated using varying assumptions agreed upon with Northrop Grumman following the T102 weir break.
(9) RVPGAC Desorb parameter values taken from January 15, 2019 event.
(10) RVPGAC Desorb parameter values taken from alternative February 13, 2019 event.
(11) RVPGAC Desorb parameter values taken from September 3, 2019 event.
(12) T102 weir effluent flow meter reading taken from November 20, 2019 event.

-- Parameter not collected/recorded
°F degrees Fahrenheit
cfm cubic feet per minute
ft feet
gal gallons
gpm gallons per minute
Hz hertz
iwc inches of water column
min minutes
psig pounds per square inch, gauge
scfm standard cubic feet per minute
NA Not Anaylzed
NC Not Calculated
NR Not Recorded
RVPGAC Regenerative Vapor Phase Granular Activated Carbon
SCADA Supervisory Control and Data Acquistion
SPDES State Pollutant Discharge Elimination System
T102 Tower 102
VFD Variable Frequency Drive
VIV Variable Influent Vane

Table 2
Summary of Non-Routine Maintenance for 2019,
Tower 96 and Tower 102 Treatment Systems,
Operable Unit 2, Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Date Completed	Maintenance Item[1]	Description/Comments
01/02/19	Tower 102 Condensate Pump	Condensate pump was shutdown for hose repair.
01/20/19	Tower 102 Knockout Tank	The strainer in the knockout tank was unclogged.
02/05/19	Tower 102 Boiler Room	System was shut down to accommodate planned boiler room repair.
02/25/19	Well 1 Sparling Water Meter	8-inch sparling water meter was replaced and calibrated.
02/25/19	South Basin No. 2 Chamber "D" Design	Frames were galvanized.
03/07/19	South Basin No. 2 Chamber "D" Design	Frames were installed.
03/18/19	Well 17 VFD Cabinet Ventilation Fan	VFD cabinet ventilation fan was repaired.
03/19/19	South Basin No. 2 Chamber "D" Design	Grates were installed.
03/29/19	Tower 102 Clearwell Pump P-401	Delta installed new pump and refurbished motor.
04/15/19	Well 1 Flow Meter Totalizer	Flow totalizer was replaced with a final volume of 1,607,210 gal. Replacement totalizer began at 896,227 gal.
05/09/19	Tower 96 Boiler Maintenance	Maintenance was performed on boiler blowdown lines.
05/22/19	Outfall 005 - South Basin #3 Maintenance	First phase of maintenance (including bottom scraping) was completed by Lasar.
05/27/19	Tower 102 Air Filters and Blower Belts	Air filters and blower belts were replaced.
05/30/19	Tower 102 Skid Outlet	Skid outlet replaced and the box type changed to waterproof.
06/11/19	Tower 96 Treatment Building Maintenance	Painting completed on floors, equipment skid, support structure, ladders, bollards, and trestles.
06/11/19	Tower 102 Treatment Building Maintenance	Indoor and outdoor painting completed.
06/11/19	Tower 96 Boiler Blowdown	Boiler blowdown replaced.
06/13/19	Tower 96 Piping Insulation	Repairs to piping insulation.
06/13/19	OXY Ductwork Weatherproof	Replaced weatherproofing on supplemental (OXY) carbon bed ductwork.
06/17/19	Well 1 VFD Failure	Variable Frequency Drive failure and subsequent repair.
07/05/19	Tower 96 Boiler Room Building Lighting	Replaced lighting.
07/19/19	Tower 96 Asphalt	Cracks in the asphalt outside the Tower 96 building were sealed.
07/24/19	Well 1 Pressure Transmitter	SCADA was recording a negative well pressure. Lexington and Flexim repaired item.
07/24/19	Tower 102 Gate Electrical Wiring / Asphalt	Cracks in the asphalt and electrical wiring were replaced at the vehicle entrance gate.
08/14/19	Tower 96 Clearwell Pump #1	Delta Well installed a new pump and refurbished-motor.
08/30/19	Well 1 Flow Meter Totalizer	Flow meter totalizer was replaced.
09/09/19	Tower 96 Treatment Building Lighting	Ramp installed and boom lift acquired for lighting replacement.
09/10/19	Outfall 006 - North Basin Maintenance	North basin scraping was completed. (Flow to northwest recharge basin was stopped on 6/07/19 and resumed on 9/16/19.)
09/13/19	Tower 96 Treatment Building Lighting	Lighting replaced.
09/20/19	Tower 96 Supplemental Beds - Carbon	The supplemental carbon beds of the Tower 96 System underwent a carbon change out.
09/30/19	Tower 96 Condensate Pump	Condensate pump was replaced.
10/09/19	Well 19 VFD Internal Fan	VFD internal fan was replaced.
10/16/19	South Basin #3 (Eastern Basin) Headwall	The headwall in the eastern basin was replaced.
10/25/19	South Basin #1 (Western Basin) Headwall	The headwall in the western basin was replaced.
11/08/19	South Basin #3 (Eastern Basin) Staff Gauge	Staff gauge was installed.
11/14/19	Tower 96 Degasser Vent Pipe	Fitting on degasser vent pipe was replaced.
11/14/19	Tower 102 Air Stack Drain	Condensate drain cap repaired.
11/14/19	Tower 102 Condensate Pump	A moisture leak from the pneumatic line was repaired.
12/04/19	Outfall 005 - South Basin #3 Maintenance	An additional scraping effort was completed concurrently with sluice gate replacements in December 2019. Given the infiltration/flow improvements followed by the scraping effort, NG canceled plans to enlarge the easternmost South Basin.
10/10/19 - 12/13/19	Well 3R Rehabilitation	Completed by Delta and returned to operation at 700 gpm.
12/23/19	Tower 102 Sluice Gates	Tower 102 was shut down from 12/16/19 to 12/17/19 to accommodate scheduled sluice gate repairs at the South Basins. Additional dates included 12/3/19 to 12/14/19, and 12/19/19 to 12/23/19.

Table 2
Summary of Non-Routine Maintenance for 2019,
Tower 96 and Tower 102 Treatment Systems,
Operable Unit 2, Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Notes and Abbreviations:

(1)	Maintenance items were completed, as necessary, based on observations of the treatment system during the routine daily and weekly site visits.
RVPGAC	Regenerative Vapor Phase Granular Activated Carbon
SCADA	Supervisory Control and Data Acquisition
T96	Tower 96 Treatment System
T102	Tower 102 Treatment System
VFD	Variable Frequency Drive
OXY	Occidental Chemical Corporation/Hooker Chemical/RUCO Polymer Corporation
NIST	National Institute of Standards and Technology
UPS	Uninterruptable Power Source
ONCT	On-Site Containment System
NIST	National Institute of Standards and Technology
NG	Northrop Grumman Systems Corporation
RVPGAC	Regenerative Vapor Phase Granular Activated Carbon
CRA	Conastoga Rovers Associates
UPS	Uninterruptable Power Source

Table 3
Operational Summary for the OU2 Groundwater Remedy,
Fourth Quarter and Annual 2019[1] Reporting Period,
Operable Unit 2,
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

	Quarterly Flow Rates (gpm)		Quarterly Flow Volumes (MG)			Annual Flow Volumes (MG)			Quarterly VOC Concentrations (µg/L)		VOC Mass Removed (lbs)[7]		
	Design[2]	Average[3,4]	Design[5]	Actual[3,6]	% of Design	Design[5]	Actual[3,6]	% of Design	TCE[4]	TVOC[3,8]	Quarterly	Annual	Cumulative
Influent Groundwater													
Well 1[8,9]	800	947	106.0	125.1	118%	420.5	422.7	101%	569	599	626	2,050	49,908
Well 3R[9]	700	681	92.7	27.4	30%	367.9	283.4	77%	172	211	48	783	92,291
Well 17[9,10]	1,000	1,085	132.5	117.9	89%	525.6	487.9	93%	114	129	127	518	54,098
Well 18[8,9,10]	600	1,005	79.5	109.1	137%	315.4	425.2	135%	36	58	53	210	6,803
Well 19[9,10]	700	531	92.7	56.1	61%	367.9	258.2	70%	98	120	56	271	8,944
Total[11]	**3,800**	**4,249**	**503**	**436**	**87%**	**1,997**	**1,877**	**94%**	**--**	**--**	**910**	**3,832**	**212,044**
Effluent Groundwater[12]													
Calpine	100 - 400	140	--	18.5	--	--	77.4	--	--	--	--	--	--
OXY Biosparge[13]	2 - 42	0	--	0	--	--	0.0	--	--	--	--	--	--
West Recharge Basins	1,112 - 1,455	1,055	--	139.8	--	--	1,795.4	--	--	0.0	--	--	--
South Recharge Basins[13]	2,231	2,093	295.6	277.3	94%	1,172.6	1,075.5	92%	--	1.5	--	--	--
Total[14]	**--**	**3,288**	**--**	**436**	**--**	**--**	**2,948**	**--**					
Additional Flow to South Recharge Basins													
Storm Water Runoff Contributing to South Recharge Basins Flow Volume[14]	--	--	--	25.3	--	--	91.4	--	--	--	--	--	--
Total Flow Volume to South Recharge Basins[13,14,15]			**296**	**303**	**102%**	**1,172.6**	**1,166.9**	**100%**					

Treatment Efficiencies[16]	
Tower 96 System:	>99.9%
Tower 102 System:	>99.9%

See Notes and Abbreviations on last page.

Table 3
Operational Summary for the OU2 Groundwater Remedy,
Fourth Quarter and Annual 2019[(1)] Reporting Period,
Operable Unit 2,
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Notes and Abbreviations:

(1) Quarterly reporting period: October 01, 2019 through December 31, 2019; Annual reporting period: January 1, 2019 through December 31, 2019.

(2) "Design" flow rates were determined for the five remedial wells and for the South Recharge Basins based on computer modeling (ARCADIS G&M, Inc. 2003c, modified in April 2005). Flow rates for Calpine, OXY Biosparge and West Recharge Basins are typical flow rates and are provided for reader information. "Design" flow volumes represent the volume of water that should be pumped/discharged during the reporting period and is calculated by multiplying the design rate by the reporting period duration.

(3) "Average" flow rates for the remedial wells represent the average actual pumping rates when the pumps are operational and do not take into account the time that a well is not operational. During this quarterly reporting period, the remedial wells operated for the following percentages of the time: Well 1 (99.7%), Well 3R (30.4%), Well 17 (82%), Well 18 (82%), and Well 19 (79.7%). "Actual" flow volumes are determined via totalized values computed by SCADA using the instantaneous flow rates transmitted from local flow meters.

(4) "Average" flow rates for the system discharges represent the average flow rate during the entire reporting period and are determined by dividing the total flow during the reporting period by the reporting period duration. The Calpine and South Recharge Basins flow volumes are determined via totalized values computed by SCADA using the instantaneous flow rates transmitted from local flow meters. The West Recharge Basin flow is calculated by subtracting the cumulative flow to the other discharges from the total influent flow. Actual flow to the recharge basins is greater, as shown, because storm water combines with the plant effluent prior to discharge to the recharge basins.

(5) The TCE and TVOC concentrations are from the quarterly sampling events performed during this reporting period on December 23, 2019 for Well 1 and Well 3R, and on December 27, 2019 for Well 17, Well 18, and Well 19.

(6) The TVOC concentration for the two sets of recharge basins are their respective average monthly SPDES concentrations for the current quarter.

(7) TVOC mass removed for the reporting period is calculated by multiplying the TVOC concentration from the quarterly sampling event and the quantity of water pumped during the reporting period. A calculation error was discovered that caused an over reporting of cumulative VOC mass removed during Quarter One, Quarter Two, and Quarter Three of this reporting period (Arcadis 2019b, 2019c, 2019d). This error has been corrected with the final value shown.

(8) During Well 3R maintenance, Well 1 and Well 18 flow rates were increased to offset loss of flow and maintain flow capture.

(9) The downtime during Fourth Quarter 2019 varied due to typical operation and maintenance with the exception of Well 19, Well 3R, and Tower 102. Well 19 was shut down from October 8, 2019 to October 10, 2019 due to VFD internal fan failure and subsequent replacement. Well 3R was shut down from October 10, 2019 through December 12, 2019 due to well maintenance efforts. (See Note 12 for detail on reduced percent design flow values.) Tower 102 was shutdown from December 3, 2019 to December 14, 2019; December 16, 2019 to December 17, 2019; and December 19, 2019 to December 23, 2019 to accommodate sluice gate repairs at the South Recharge Basins.

(10) From June 12, 2019 to December 18, 2019, the weir flow element for the South Recharge Basins was damaged. Thus, South Basin flow data were estimated using varying assumptions agreed upon with Northrop Grumman following the T102 weir break.

(11) Total pumpage/recharge rates are accurate to ±15% due to limitations in metering.

(12) There are four possible discharges for the effluent groundwater: South Recharge Basins, West Recharge Basins, Calpine, and OXY Biosparge system. Treated water is continuously discharged to the south and west recharge basins during routine operation, and is available "on-demand" to both the Calpine Power Plant (Calpine) for use as make-up water, and the biosparge remediation system operated by Occidental Chemical (OXY Biosparge).

(13) Occidental Chemical has not reported any water usage for the OXY Biosparge system since May 2016.

(14) Storm Water Runoff Volume is calculated by multiplying the adjusted tributary area and NOAA precipitation data for the reporting periods. The adjusted tributary area is tributary area that is adjusted by the runoff coefficient to exclude the infiltration volume from the total rainfall volume. The tributary area, runoff coefficient, and adjusted tributary area are from Dvirka and Bartilucci Consulting Engineers' Storm Water Permit Evaluation Report (January, 28, 2010). The NOAA precipitation data are calculated as a sum of NOAA daily precipitation data for the reporting period. NOAA precipitation data are retrieved from Station GHCND:USW00054787 - FARMINGDALE REPUBLIC AIRPORT, NY US for October and December; Station GHCND:US1NYNS0030 - PLAINEDGE, NY US for November as data was not available for the typical station.

(15) Total Flow Volume to South Recharge Basins is estimated as a sum of flow volumes contributed from the Effluent Groundwater to South Recharge Basins and from Storm Water Runoff to South Recharge Basins.

(16) Treatment System Efficiencies are calculated by dividing the difference between the remedial well flow weighted influent and effluent TVOC concentrations by the remedial well flow weighted influent concentration.

--	Not Applicable
µg/L	micrograms per liter
gpm	gallons per minute
lbs	pounds
MG	million gallons
NOAA	National Oceanic and Atmospheric Administration
SCADA	Supervisory Controls and Data Acquisition
SPDES	State Pollution Discharge Elimination System
TCE	trichloroethene
TVOC	total volatile organic compounds
VOC	volatile organic compounds

Table 4
Summary of Operable Unit 2 Volatile Organic Compounds and
1,4-Dioxane in 2019 Remedial Well Influents and
Treatment System Effluent,
Operable Unit 2
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Constituents[1] (units in µg/L)	Location ID: Sample ID: Sample Date:	WELL 1 WELL 1 2/13/2019	WELL 1 WELL 1 6/13/2019	WELL 1 WELL 1 9/6/2019	WELL 1 WELL 1 12/23/2019
Volatile Organic Compounds (VOCs)[2]	NYSDEC SCGs[3]				
1,1,1-Trichloroethane	5	< 1.3	< 1.3	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	5	< 2.5	< 2.5	< 1.0	< 1.0
1,1,2-Trichloroethane	5	< 2.5	< 2.5	< 1.0	< 1.0
1,1-Dichloroethane	5	< 2.5	**0.67 J**	**0.71 J**	**0.68**
1,1-Dichloroethene	5	**2.0**	**1.8**	**2.1**	**2.1**
1,2-Dichloroethane	5	< 2.5	< 2.5	< 1.0	< 1.0
1,2-Dichloropropane	5	**4.4**	**4.8**	**4.2**	**4.1**
2-Butanone (MEK)	50	< 25	< 25	< 10	< 10
2-Hexanone (MBK)	50	< 13	< 13	< 5.0	< 5.0
4-methyl-2-pentanone (MIK)	50	< 13	< 13	< 5.0	< 5.0
Acetone	50	< 25	< 25	< 10	< 10
Benzene	1	< 1.3	< 1.3	< 0.50	< 0.50
Bromodichloromethane	50	< 2.5	< 2.5	< 1.0	< 1.0
Bromoform	50	< 2.5	< 2.5	< 1.0	< 1.0
Bromomethane	5	< 5.0	< 5.0	< 2.0	< 2.0
Carbon Disulfide	50	< 5.0	< 5.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 2.5	< 2.5	< 1.0	< 1.0
Chlorobenzene	5	< 2.5	< 2.5	< 1.0	< 1.0
Chloroethane	5	< 2.5	< 2.5	< 1.0	< 1.0
Chloroform	7	< 1.3	**0.51**	**0.55**	**0.49**
Chloromethane	5	< 2.5	< 2.5	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	**5.4**	**5.1**	**5.6**	**5.2**
cis-1,3-Dichloropropene	5	< 2.5	< 2.5	< 1.0	< 1.0
Dibromochloromethane	5	< 2.5	< 2.5	< 1.0	< 1.0
Ethylbenzene	5	< 2.5	< 2.5	< 1.0	< 1.0
Methylene Chloride	5	< 1.3	< 1.3	< 0.50	< 0.50
Styrene	5	< 2.5	< 2.5	< 1.0	< 1.0
Tetrachloroethene	5	**16.6**	**15.1**	**16.7**	**14.4**
Toluene	5	< 2.5	< 2.5	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 1.3	< 1.3	< 0.50	< 0.50
trans-1,3-Dichloropropene	5	< 2.5	< 2.5	< 1.0	< 1.0
Trichloroethylene	5	**589 D**	**488 D**	**546**	**569**
Trichlorotrifluoroethane (Freon 113)	5	**2.2**	**2.0**	**2.6**	**2.6**
Vinyl Chloride	2	< 1.3	< 1.3	< 0.50	< 0.50
Xylene-o	5	< 2.5	< 2.5	< 1.0	< 1.0
Xylene-m,p	5	< 2.5	< 2.5	< 1.0	< 1.0
Total VOCs[4]		**620**	**520**	**580**	**600**
1,4-Dioxane[2]	NS	**8.1**	**5.9**	**5.1**	**9.7**

See Notes and Abbreviations on last page.

Table 4
Summary of Operable Unit 2 Volatile Organic Compounds and
1,4-Dioxane in 2019 Remedial Well Influents and
Treatment System Effluent,
Operable Unit 2
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Constituents[1] (units in µg/L)	Location ID: Sample ID: Sample Date:	WELL 3R WELL 3R 2/13/2019	WELL 3R WELL 3R 6/13/2019	WELL 3R WELL 3R 9/6/2019	WELL 3R WELL 3R 12/23/2019
Volatile Organic Compounds (VOCs)[2]	NYSDEC SCGs[3]				
1,1,1-Trichloroethane	5	**0.64**	< 0.50	**0.61**	**0.51**
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	**1.4**	**1.4**	**1.5**	**1.3**
1,1-Dichloroethene	5	**3.8**	**3.3**	**3.6**	**2.8**
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10	< 10	< 10	< 10
2-Hexanone (MBK)	50	< 5.0	< 5.0	< 5.0	< 5.0
4-methyl-2-pentanone (MIK)	50	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	50	< 10	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	**0.86**
Chloroform	7	< 0.50	< 0.50	< 0.50	< 0.50
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	**4.0**	**3.5**	**3.8**	**3.6**
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	5	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	5	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	**30.8**	**25.1**	**27.9**	**29.2**
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethylene	5	**333 EJ** [4]	**273**	**298**	**172**
Trichlorotrifluoroethane (Freon 113)	5	**3.4**	< 0.50	**2.4**	**1.8**
Vinyl Chloride	2	**1.7**	**1.1**	**1.3**	**1.3**
Xylene-o	5	< 1.0	< 1.0	< 1.0	< 1.0
Xylene-m,p	5	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs[4]		**380**	**310**	**340**	**210**
1,4-Dioxane[2]	NS	**10.0**	**10.0**	**11.0**	**15**

See Notes and Abbreviations on last page.

Table 4
Summary of Operable Unit 2 Volatile Organic Compounds and
1,4-Dioxane in 2019 Remedial Well Influents and
Treatment System Effluent,
Operable Unit 2
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Constituents[1] (units in µg/L)	Location ID: Sample ID: Sample Date:	96 EFFLUENT 96 EFFLUENT 2/13/2019	96 EFFLUENT 96 EFFLUENT 6/13/2019	96 EFFLUENT 96 EFFLUENT 9/6/2019	96 EFFLUENT 96 EFFLUENT 12/23/2019
Volatile Organic Compounds (VOCs)[2]	NYSDEC SCGs[3]				
1,1,1-Trichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10	< 10	< 10	< 10
2-Hexanone (MBK)	50	< 5.0	< 5.0	< 5.0	< 5.0
4-methyl-2-pentanone (MIK)	50	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	50	< 10	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	< 0.50	< 0.50	< 0.50	< 0.50
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	5	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	5	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethylene	5	< 0.50	**0.89**	< 0.50	< 0.50
Trichlorotrifluoroethane (Freon 113)	5	< 0.50	< 0.50	< 0.50	< 0.50
Vinyl Chloride	2	< 0.50	< 0.50	< 0.50	< 0.50
Xylene-o	5	< 1.0	< 1.0	< 1.0	< 1.0
Xylene-m,p	5	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs[4]		0.0	1.0	0.0	0.0
1,4-Dioxane[2]	NS	**9.8**	**8.1**	**7.2**	**10**

See Notes and Abbreviations on last page.

Table 4
Summary of Operable Unit 2 Volatile Organic Compounds and
1,4-Dioxane in 2019 Remedial Well Influents and
Treatment System Effluent,
Operable Unit 2
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Constituents[1] (units in µg/L)	Location ID: Sample ID: Sample Date:	WELL 17 WELL 17 2/13/2019	WELL 17 WELL 17 6/11/2019	WELL 17 WELL 17 8/6/2019	WELL 17 WELL 17 12/27/2019
Volatile Organic Compounds (VOCs)[2]	NYSDEC SCGs[3]				
1,1,1-Trichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	**0.75 J**	**0.73 J**	**0.72 J**	**0.69**
1,1-Dichloroethene	5	**1.4**	**1.2**	**1.4**	**0.73**
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	**0.52**
2-Butanone (MEK)	50	< 10	< 10	< 10	< 10
2-Hexanone (MBK)	50	< 5.0	< 5.0	< 5.0	< 5.0
4-methyl-2-pentanone (MIK)	50	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	50	< 10	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	< 0.50	< 0.50	< 0.50	< 0.50
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	**2.5**	**2.2**	**2.4**	**2.3**
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	5	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	5	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	**18.9**	**15.8**	**17.6**	**14.8**
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethylene	5	**108**	**99.3**	**105**	**114**
Trichlorotrifluoroethane (Freon 113)	5	**2.9**	**2.0**	**2.5**	**2.4**
Vinyl Chloride	2	< 0.50	< 0.50	< 0.50	< 0.50
Xylene-o	5	< 1.0	< 1.0	< 1.0	< 1.0
Xylene-m,p	5	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs[4]		**130**	**120**	**130**	**130**
1,4-Dioxane[2]	NS	**7.3**	**6.8**	**6.0**	**9.0**

See Notes and Abbreviations on last page.

Table 4
Summary of Operable Unit 2 Volatile Organic Compounds and
1,4-Dioxane in 2019 Remedial Well Influents and
Treatment System Effluent,
Operable Unit 2
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Constituents[1] (units in µg/L)	Location ID: Sample ID: Sample Date:	WELL 18 WELL 18 2/13/2019	WELL 18 WELL 18 6/13/2019	WELL 18 REP-061319-MG-1 6/13/2019	WELL 18 WELL 18 8/6/2019	WELL 18 WELL 18 12/27/2019
Volatile Organic Compounds (VOCs)[2]	NYSDEC SCGs[3]					
1,1,1-Trichloroethane	5	**0.35 J**	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	**1.3**	**1.4**	**1.4**	**1.4**	**1.4**
1,1-Dichloroethene	5	**3.0**	< 0.50	**2.7**	**3.0**	**2.8**
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10	< 10	< 10	< 10	< 10
2-Hexanone (MBK)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
4-methyl-2-pentanone (MIK)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	50	< 10	< 10	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	**2.6**	**2.3**	**2.7**	**2.8**	**2.7**
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	**15.0**	**13.5**	**13.6**	**14.2**	**13.9**
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethylene	5	**41.1**	**36.3**	**36.6**	**36.1**	**36.3**
Trichlorotrifluoroethane (Freon 113)	5	**1.4**	< 0.50	< 0.50	**1.2**	**1.2**
Vinyl Chloride	2	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Xylene-o	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene-m,p	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs[4]		**65**	**54**	**57**	**59**	**58**
1,4-Dioxane[2]	NS	**5.7**	**4.9**	**5.8**	**4.6**	**5.8**

See Notes and Abbreviations on last page.

Table 4
Summary of Operable Unit 2 Volatile Organic Compounds and
1,4-Dioxane in 2019 Remedial Well Influents and
Treatment System Effluent,
Operable Unit 2
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Constituents[1] (units in µg/L)	Location ID: Sample ID: Sample Date:	WELL 19 WELL 19 2/13/2019	WELL 19 [illegible] 2/13/2019	WELL 19 WELL 19 5/13/2019	WELL 19 WELL 19 8/6/2019
Volatile Organic Compounds (VOCs)[2]	NYSDEC SCGs[3]				
1,1,1-Trichloroethane	5	**0.25 J**	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	**0.62 J**	**0.64 J**	**0.63 J**	**0.67 J**
1,1-Dichloroethene	5	**1.3**	**1.3**	**1.2**	**1.3**
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10	< 10	< 10	< 10
2-Hexanone (MBK)	50	< 5.0	< 5.0	< 5.0	< 5.0
4-methyl-2-pentanone (MIK)	50	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	50	< 10	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	**0.38 J**	< 0.50	< 0.50	< 0.50
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	**15.0**	**15.4**	**13.3**	**14.4**
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	5	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	5	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	**6.8**	**6.7**	**6.0**	**6.0**
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethylene	5	**112**	**112**	**95.1**	**97.7**
Trichlorotrifluoroethane (Freon 113)	5	**1.0**	< 0.50	< 0.50	**1.1**
Vinyl Chloride	2	< 0.50	< 0.50	< 0.50	< 0.50
Xylene-o	5	< 1.0	< 1.0	< 1.0	< 1.0
Xylene-m,p	5	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs[4]		140	140	120	120
1,4-Dioxane[2]	NS	4.6 J	3.2 J	3.9	3.4

See Notes and Abbreviations on last page.

Table 4
Summary of Operable Unit 2 Volatile Organic Compounds and
1,4-Dioxane in 2019 Remedial Well Influents and
Treatment System Effluent,
Operable Unit 2
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Constituents[1] (units in µg/L)	Location ID: Sample ID: Sample Date:	WELL 19 REP-080619-JJC-1 8/6/2019	WELL 19 WELL 19 12/27/2019	WELL 19 REP-122719-RA-1 12/27/2019
Volatile Organic Compounds (VOCs)[2]	NYSDEC SCGs[3]			
1,1,1-Trichloroethane	5	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	**0.65 J**	**0.60**	**0.57**
1,1-Dichloroethene	5	**1.2**	**1.2**	**1.2**
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10	< 10	< 10
2-Hexanone (MBK)	50	< 5.0	< 5.0	< 5.0
4-methyl-2-pentanone (MIK)	50	< 5.0	< 5.0	< 5.0
Acetone	50	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0
Chloroform	7	< 0.50	**0.33**	**0.32**
Chloromethane	5	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	**14.6**	**12.2**	**11.5**
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0
Dibromochloromethane	5	< 1.0	< 1.0	< 1.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0
Methylene Chloride	5	< 0.50	< 0.50	< 0.50
Styrene	5	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	**5.8**	**5.4**	**5.1**
Toluene	5	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0
Trichloroethylene	5	**97.8**	**85.9**	**82.6**
Trichlorotrifluoroethane (Freon 113)	5	**1.0**	**0.91**	**0.83**
Vinyl Chloride	2	< 0.50	< 0.50	< 0.50
Xylene-o	5	< 1.0	< 1.0	< 1.0
Xylene-m,p	5	< 1.0	< 1.0	< 1.0
Total VOCs[4]		**120**	**110**	**100**
1,4-Dioxane[2]	**NS**	**NA**	**5.1**	**3.7**

See Notes and Abbreviations on last page.

Table 4
Summary of Operable Unit 2 Volatile Organic Compounds and
1,4-Dioxane in 2019 Remedial Well Influents and
Treatment System Effluent,
Operable Unit 2
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Constituents[1] (units in µg/L)	Location ID: Sample ID: Sample Date:	102 EFFLUENT 102 EFFLUENT 2/13/2019	102 EFFLUENT 102 EFFLUENT 6/13/2019	102 EFFLUENT 102 EFFLUENT 8/6/2019	102 EFFLUENT T102 EFFLUENT 12/27/2019
Volatile Organic Compounds (VOCs)[2]	NYSDEC SCGs[3]				
1,1,1-Trichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10	< 10	< 10	< 10
2-Hexanone (MBK)	50	< 5.0	< 5.0	< 5.0	< 5.0
4-methyl-2-pentanone (MIK)	50	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	50	< 10	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	< 0.50	< 0.50	< 0.50	< 0.50
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	5	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	5	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethylene	5	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorotrifluoroethane (Freon 113)	5	< 0.50	< 0.50	< 0.50	< 0.50
Vinyl Chloride	2	< 0.50	< 0.50	< 0.50	< 0.50
Xylene-o	5	< 1.0	< 1.0	< 1.0	< 1.0
Xylene-m,p	5	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs[4]		0.0	0.0	0.0	0.0
1,4-Dioxane[2]	NS	**5.7**	**5**	**4.9**	**6.8**

See Notes and Abbreviations on last page.

Table 4
Summary of Operable Unit 2 Volatile Organic Compounds and
1,4-Dioxane in 2019 Remedial Wells and
Treatment System Effluent,
Operable Unit 2
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Notes and Abbreviations:

(1) Results for the program are validated at 20% frequency, per protocols specified in OU2 Groundwater Monitoring Plan (Arcadis 2016c).

(2) VOC samples analyzed using USEPA Method 8260C. 1,4-Dioxane samples analyzed using USEPA Method 8270D-SIM-CLLE.

(3) Standards, Criteria, and Guidance (SCG) values based on documents referenced in the Groundwater Feasibility Study Report (ARCADIS Geraghty & Miller, Inc. 2000) that are based on the NYSDEC TOGs (NYSDEC 1998); most stringent values are listed.

(4) Total VOC results rounded to two significant figures.

	Compound detected in exceedance of NYSDEC SCG Criteria
1.2	Bold value indicates a detection
< 5.0	Compound is not detected above its laboratory quantification limit
µg/L	micrograms per liter
CLLE	Continuous Liquid-Liquid Extraction
J	Constituent value is estimated
NS	None Specified
NYSDEC	New York State Department of Conservation
OU2	Operable Unit 2
REP	blind replicate sample
TOGs	Technical and Operational Guidance Series
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

Table 5A
Influent, Mid-Effluent, and Effluent Air Concentrations for 2019[1,3],
Tower 96 Treatment System,
Operable Unit 2, Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Location ID: / Sample ID: / Constituents (Units in µg/m³)	96 INFLUENT T96 INFLUENT (AA) 2/13/2019	96 INFLUENT T96 INFLUENT (AA) 6/13/2019	96 INFLUENT T96 INFLUENT (AA) 10/3/2019[3]	96 INFLUENT T96 INFLUENT (AA) 12/23/2019
Volatile Organic Compounds (VOCs)[1]				
1,1,1-Trichloroethane	**17**	**21**	**15**	**11**
1,1,2,2-Tetrachloroethane	< 0.55	< 0.55	< 0.69	< 0.69
1,1,2-Trichloroethane	**2.6**	**3.7**	**2.5**	**2.1**
1,1-Dichloroethane	**46**	**55.4**	**34**	**31**
1,1-Dichloroethene	**105**	**75.3**	**89.2**	**81.7**
1,2-Dichloroethane	**2.6**	**3.5**	**2.4**	**1.8**
1,2-Dichloropropane	**108**	**128**	**88.3**	**74.4**
Benzene	**1.2**	**1.3**	**0.89**	**1.9**
Bromodichloromethane	< 0.54	< 0.54	< 0.67	< 0.67
Bromoform	< 0.33	< 0.33	< 0.41	< 0.41
Bromomethane	< 0.62	< 0.62	< 0.78	< 0.78
Carbon Disulfide	< 0.50	< 0.50	< 0.62	< 0.62
Carbon Tetrachloride	**3.1**	**4.5**	**3.4**	**2.5**
Chlorobenzene	**1.1**	**1.2**	**1.4**	**1.2**
Chloroethane	**2.4**	**3.4**	**3.2**	**3.7**
Chloroform	**17**	**23**	**19**	**13**
Chloromethane	**0.97**	**1.3**	**0.87**	**0.83**
cis-1,2-Dichloroethene	**145**	**125**	**139**	**156**
cis-1,3-Dichloropropene	< 0.73	< 0.73	< 0.91	< 0.91
Dibromochloromethane	< 0.68	< 0.68	< 0.85	< 0.85
Ethylbenzene	< 0.69	< 0.69	< 0.87	**0.4 J**
Methylene Chloride	**0.8**	**0.83**	**1.4**	**0.7**
Styrene	< 0.68	< 0.68	< 0.85	< 0.85
Tetrachloroethene	**685**	**523**	**759**	**895**
Toluene	**0.33 J**	**0.45 J**	< 0.75	**2.0**
trans-1,2-Dichloroethene	**1.8**	**2.7**	**1.5**	**1.6**
trans-1,3-Dichloropropene	< 0.73	< 0.73	< 0.91	< 0.91
Trichloroethylene	**16,700**	**23,300**	**20,700**	**13,400**
Trichlorotrifluoroethane (Freon 113)	**125**	**148**	**93.5**	**75**
Vinyl Chloride	**24**	**25**	**22**	**19**
Xylene-o	< 0.69	**1.2**	< 0.87	**0.48 J**
Xylene-m,p	< 0.69	**0.83**	< 0.87	**1.1**
Total VOCs [2]	**17,989**	**24,449**	**21,977**	**14,776**

See Notes and Abbreviations on last page.

Table 5A
Influent, Mid-Effluent, and Effluent Air Concentrations for 2019[1,3],
Tower 96 Treatment System,
Operable Unit 2, Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Location ID: / Sample ID: / Constituents (Units in µg/m³)	96 MID-EFFLUENT T96 MIDTRAIN (AA) 2/13/2019	96 MID-EFFLUENT T96 MIDTRAIN (AA) 6/13/2019	96 MID-EFFLUENT T96 MIDTRAIN (AA) 10/3/2019[3]	96 MID-EFFLUENT T96 MIDTRAIN (AA) 12/23/2019
Volatile Organic Compounds (VOCs)[1]				
1,1,1-Trichloroethane	**4.5**	**3.7**	< 0.55	**1.7**
1,1,2,2-Tetrachloroethane	< 0.55	< 0.55	< 0.69	**2990**
1,1,2-Trichloroethane	< 0.44	< 0.44	< 0.55	< 0.55
1,1-Dichloroethane	**27**	**21**	**1.4**	**13**
1,1-Dichloroethene	**98.3**	**82.9**	**3.8**	**38**
1,2-Dichloroethane	**0.77**	**0.61 J**	< 0.81	< 0.81
1,2-Dichloropropane	**19**	**13**	< 0.92	**11**
Benzene	**0.38 J**	< 0.51	< 0.64	**0.48 J**
Bromodichloromethane	< 0.54	< 0.54	< 0.67	< 0.67
Bromoform	< 0.33	< 0.33	< 0.41	< 0.78
Bromomethane	< 0.62	< 0.62	< 0.78	< 0.78
Carbon Disulfide	**3.7**	< 0.50	< 0.62	< 0.62
Carbon Tetrachloride	< 0.20	**0.69**	< 0.25	< 0.25
Chlorobenzene	< 0.74	< 0.74	< 0.92	< 0.92
Chloroethane	**2.3**	**2.2**	**0.25 J**	**1.9**
Chloroform	**8.3**	**7.3**	**0.68 J**	**4.7**
Chloromethane	**1**	**1.2**	**1.1**	**1.3**
cis-1,2-Dichloroethene	**90.0**	**98.7**	**5.6**	**63.8**
cis-1,3-Dichloropropene	< 0.73	< 0.73	< 0.91	< 0.91
Dibromochloromethane	< 0.68	< 0.68	< 0.85	< 0.85
Ethylbenzene	< 0.69	< 0.69	< 0.87	< 0.87
Methylene Chloride	**0.83**	**0.66**	< 0.69	**0.52 J**
Styrene	< 0.68	< 0.68	< 0.85	< 0.85
Tetrachloroethene	**95.6**	**81.4**	**9.5**	**50**
Toluene	**1.3**	< 0.60	< 0.75	**0.75**
trans-1,2-Dichloroethene	**1.2**	**1.1**	< 0.79	**0.71 J**
trans-1,3-Dichloropropene	< 0.73	< 0.73	< 0.91	< 0.91
Trichloroethylene	**4,270**	**2,250**	**279**	**2,990**
Trichlorotrifluoroethane (Freon 113)	**50**	**43**	**3.1**	**15**
Vinyl Chloride	**22**	**19**	**1.2**	**9.7**
Xylene-o	< 0.69	< 0.69	< 0.87	**0.26 J**
Xylene-m,p	< 0.69	**0.42 J**	< 0.87	**0.52 J**
Total VOCs [2]	**4,696**	**2,627**	**306**	**6,193**

See Notes and Abbreviations on last page.

Table 5A
Influent, Mid-Effluent, and Effluent Air Concentrations for 2019[1,3],
Tower 96 Treatment System,
Operable Unit 2, Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Location ID: / Sample ID: / Constituents (Units in µg/m³)	96 EFFLUENT T96 EFFLUENT (AA) 2/13/2019	96 EFFLUENT T96 EFFLUENT (AA) 6/13/2019	96 EFFLUENT T96 EFFLUENT (AA) 10/3/2019[3]	96 EFFLUENT T96 EFFLUENT (AA) 12/23/2019
Volatile Organic Compounds (VOCs)[1]				
1,1,1-Trichloroethane	**4.5**	**6.0**	< 0.55	< 0.55
1,1,2,2-Tetrachloroethane	< 0.55	< 0.55	< 0.69	< 0.69
1,1,2-Trichloroethane	< 0.44	< 0.44	< 0.55	< 0.69
1,1-Dichloroethane	**21**	**25**	**0.61 J**	**11**
1,1-Dichloroethene	**65.4**	**90.4**	**0.75**	**36**
1,2-Dichloroethane	**0.73**	**0.93**	< 0.81	< 0.81
1,2-Dichloropropane	**2.5**	**9.7**	< 0.92	< 0.92
Benzene	**0.64**	**0.8**	**1.3**	**1.9**
Bromodichloromethane	< 0.54	< 0.54	< 0.67	< 0.67
Bromoform	< 0.33	< 0.33	< 0.41	< 0.41
Bromomethane	< 0.62	< 0.62	< 0.78	< 0.78
Carbon Disulfide	< 0.50	< 0.50	< 0.62	< 0.62
Carbon Tetrachloride	< 0.20	**0.41**	< 0.25	< 0.25
Chlorobenzene	< 0.74	< 0.74	< 0.92	< 0.92
Chloroethane	**1.6**	**2.5**	**1.9**	**2.9**
Chloroform	**6.8**	**9.3**	< 0.98	**4**
Chloromethane	**1.7**	**2.3**	**1.9**	**1.8**
cis-1,2-Dichloroethene	**105**	**81.3**	**2.6**	**74.9**
cis-1,3-Dichloropropene	< 0.73	< 0.73	< 0.91	< 0.91
Dibromochloromethane	< 0.68	< 0.68	< 0.85	< 0.85
Ethylbenzene	< 0.69	< 0.69	< 0.87	< 0.87
Methylene Chloride	**0.87**	**0.63**	< 0.69	**0.94**
Styrene	< 0.68	< 0.68	< 0.85	< 0.85
Tetrachloroethene	**0.75**	**1.5**	**0.75**	**1.5**
Toluene	**39.6**	**63.7**	**24**	**32**
trans-1,2-Dichloroethene	**0.87**	**1.4**	< 0.79	**0.83**
trans-1,3-Dichloropropene	< 0.73	< 0.73	< 0.91	< 0.91
Trichloroethylene	**1,270**	**3,490**	**57**	**79**
Trichlorotrifluoroethane (Freon 113)	**58**	**66**	**1.4**	**1.8**
Vinyl Chloride	**16**	**19**	**15**	**14**
Xylene-o	< 0.69	< 0.69	< 0.87	**0.31 J**
Xylene-m,p	**0.52 J**	< 0.69	< 0.87	**0.52 J**
Total VOCs [2]	**1,596**	**3,871**	**107**	**263**

See Notes and Abbreviations on last page.

Table 5A
Influent, Mid-Effluent, and Effluent Air Concentrations for 2018[1,3],
Tower 96 Treatment System,
Operable Unit 2, Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Notes and Abbreviations:

(1) Vapor samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per Modified USEPA Method TO-15.

(2) Total VOCs represents the sum of individual concentrations of compounds detected rounded to the nearest whole number.

(3) System air sampling delayed due to ONCT System shut down on September 13, 2019 caused by a condensate pump failure. The pump was replaced and Tower 96 resumed normal operation on September 30, 2019.

19 bold value indicates a detection

J Compound detected below its reporting limit; value is estimated

µg/m^3 micrograms per cubic meter

ELAP Environmental Laboratory Approval Program

NYSDEC New York State Department of Environmental Conservation

NYSDOH New York State Department of Health

USEPA United States Environmental Protection Agency

VOC Volatile Organic Compound

Table 5B
Influent and Effluent Air Concentrations for 2019[1],
Tower 102 Treatment System,
Operable Unit 2, Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Location ID: / Sample ID: / Constituents (Units in µg/m³)	102 INFLUENT T102 INFLUENT (AA) 2/13/2019	102 INFLUENT T102 INFLUENT (AA) 6/13/2019	102 INFLUENT T102 INFLUENT (AA) 10/3/2019[3]	102 INFLUENT T102 INFLUENT (AA) 12/27/2019
Volatile Organic Compounds (VOCs)[1]				
1,1,1-Trichloroethane	**8.2**	**9.3**	**4.6**	**8.7**
1,1,2,2-Tetrachloroethane	< 0.55	< 0.55	< 0.69	< 0.55
1,1,2-Trichloroethane	**0.98**	**1.1**	**0.71**	**40.9**
1,1-Dichloroethane	**31**	**38**	**15.0**	**40.9**
1,1-Dichloroethene	**63**	**76.9**	**25**	**73**
1,2-Dichloroethane	**2.5**	**4.9**	**2.4**	**12**
1,2-Dichloropropane	**5.5**	**7.9**	**5.1**	**12**
Benzene	**0.67**	**0.54**	< 0.64	**1**
Bromodichloromethane	< 0.54	< 0.54	< 0.67	< 0.54
Bromoform	< 0.33	< 0.33	< 0.41	< 0.33
Bromomethane	< 0.62	< 0.62	< 0.78	< 0.62
Carbon Disulfide	< 0.50	< 0.50	< 0.62	< 0.5
Carbon Tetrachloride	**3.3**	**3.9**	**2.2**	**5.2**
Chlorobenzene	< 0.74	< 0.74	< 0.92	< 0.74
Chloroethane	< 0.42	< 0.42	< 0.53	< 0.42
Chloroform	**8.8**	**13**	**5.4**	**12**
Chloromethane	**0.83**	**1.1**	**0.78**	**0.99**
cis-1,2 Dichloroethene	**187**	**290**	**147**	**292**
cis-1,3-Dichloropropene	< 0.73	< 0.73	< 0.91	< 0.73
Dibromochloromethane	< 0.68	< 0.68	< 0.85	< 0.68
Ethylbenzene	< 0.69	< 0.69	< 0.87	< 0.69
Methylene Chloride	**0.63**	**0.69**	**0.73**	**0.66**
Styrene	< 0.68	< 0.68	< 0.85	< 0.68
Tetrachloroethene	**272**	**165**	**206**	**434**
Toluene	**0.49 J**	**0.64**	< 0.75	**0.79**
trans-1,2-Dichloroethene	**1.9**	**2.7**	**1.0**	**2.6**
trans-1,3-Dichloropropene	< 0.73	< 0.73	< 0.91	< 0.73
Trichloroethylene	**2,230**	**1,990**	**1,670**	**3,400**
Trichlorotrifluoroethane (Freon 113)	**47**	**48.0**	**21**	**48.0**
Vinyl Chloride	< 0.082	**0.24**	< 0.10	**0.31**
Xylene-o	< 0.69	< 0.69	< 0.87	< 0.69
Xylene-m,p	**0.48 J**	< 0.69	**0.65 J**	**0.52 J**
Total VOCs [2]	**2,864**	**2,654**	**2,108**	**4,385**

See Notes and Abbreviations on last page.

Table 5B
Influent and Effluent Air Concentrations for 2019[1],
Tower 102 Treatment System,
Operable Unit 2, Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Location ID: / Sample ID: / Constituents (Units in µg/m³)	102 EFFLUENT T102 EFFLUENT (AA) 2/13/2019	102 EFFLUENT T102 EFFLUENT (AA) 6/13/2019	102 EFFLUENT T102 EFFLUENT (AA) 10/3/2019[3]	102 EFFLUENT T102 EFFLUENT (AA) 12/27/2019
Volatile Organic Compounds (VOCs)[1]				
1,1,1-Trichloroethane	**0.71**	**0.82**	**1.9**	**0.82**
1,1,2,2-Tetrachloroethane	< 0.55	< 0.55	< 0.69	< 0.55
1,1,2-Trichloroethane	< 0.44	< 0.44	< 0.55	< 0.44
1,1-Dichloroethane	**27**	**32**	**39**	**28**
1,1-Dichloroethene	**66.6**	**82.9**	**84.1**	**63**
1,2-Dichloroethane	< 0.65	< 0.65	< 0.81	< 0.65
1,2-Dichloropropane	< 0.74	< 0.74	< 0.92	< 0.74
Benzene	< 0.51	< 0.03	< 0.64	< 0.51
Bromodichloromethane	< 0.54	< 0.54	< 0.67	< 0.54
Bromoform	< 0.33	< 0.33	< 0.41	< 0.33
Bromomethane	< 0.62	< 0.62	< 0.78	< 0.62
Carbon Disulfide	< 0.50	< 0.50	< 0.62	< 0.5
Carbon Tetrachloride	< 0.20	**0.33**	**0.69**	< 0.2
Chlorobenzene	< 0.74	< 0.74	< 0.92	< 0.74
Chloroethane	< 0.42	< 0.42	< 0.53	< 0.42
Chloroform	**4.2**	**4.9**	**9.3**	**4.4**
Chloromethane	**0.74**	**0.97**	**0.7**	**0.91**
cis-1,2 Dichloroethene	**44.8**	**57.5**	**109**	**47.6**
cis-1,3-Dichloropropene	< 0.73	< 0.73	< 0.73	< 0.73
Dibromochloromethane	< 0.68	< 0.68	< 0.85	< 0.68
Ethylbenzene	< 0.69	< 0.69	**0.52 J**	< 0.69
Methylene Chloride	**1.6**	**0.69**	**0.73**	**0.73**
Styrene	< 0.68	< 0.68	< 0.85	< 0.68
Tetrachloroethene	< 0.22	**3.1**	< 0.27	**6.4**
Toluene	**0.49 J**	< 0.60	< 0.75	< 0.60
trans-1,2-Dichloroethene	**0.63**	**0.91**	**1.6**	**0.63**
trans-1,3-Dichloropropene	< 0.73	< 0.73	< 0.91	< 0.73
Trichloroethylene	**16**	**34**	**17**	**35**
Trichlorotrifluoroethane (Freon 113)	**61**	**57**	**66**	**43**
Vinyl Chloride	**0.21**	**0.26**	< 0.10	**0.36**
Xylene-o	< 0.69	< 0.69	< 0.87	< 0.69
Xylene-m,p	< 0.69	< 0.69	**2.0**	< 0.69
Total VOCs [2]	**224**	**275**	**333**	**231**

See Notes and Abbreviations on last pag

Table 5B
Influent and Effluent Air Concentrations for 2019[1],
Tower 102 Treatment System,
Operable Unit 2, Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Notes and Abbreviations:

(1) Vapor samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per Modified USEPA Method TO-15.

(2) Total VOCs represents the sum of individual concentrations of compounds detected rounded to the nearest whole number.

(3) System air sampling delayed due to ONCT System shut down on September 13, 2019 caused by a condensate pump failure. The pump was replaced and Tower 96 resumed normal operation on September 30, 2019.

8.2 bold value indicates a detection

J Compound detected below its reporting limit; value is estimated
µg/m^3 micrograms per cubic meter
ELAP Environmental Laboratory Approval Program
NYSDOH New York State Department of Health
USEPA United States Environmental Protection Agency
VOC volatile organic compound

Table 5C
Summary of TCE Mass Removal for 2019,
Operable Unit 2, Tower 96 Treatment System,
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Date	TCE Concentration (µg/m^3)[1]				TCE Mass Emission[2]	Percent of Allowable TCE Emissions[3]
	T96 INFLUENT	T96 MIDTRAIN	T96 SUP MIDTRAIN	T96 EFFLUENT	(lbs)	12 Month Rolling Average
12/7/2018	14,400	3,190	NS	720	29.2	18.1%
2/13/2019	17,989	4,696	NS	1596	37.6[4]	25.4%
6/13/2019	24,449	2,627	NS	3871	179	54.2%
10/3/2019 [5,6]	21,977	306	NS	107	2.8	48.0%
12/23/2019	13,400	2,990	NS	79	2.8	42.7%

Notes and Abbreviations:

(1) Vapor samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP-certified laboratory for VOC analyses per Modified USEPA Method TO-15.

(2) TCE Mass Emission calculated based on the exhaust air flow rate on the day of sampling and the period of time since the preceding day of sampling.
TCE (lb) = TCE Concentration [µg/m^3] x Days x Flow Rate [ft^3/min] x (1 m^3/35 ft^3) x (60 min/hr) x (24 hr/day) x (0.000001 g/1 ug) x (0.0022 lb/g)

(3) Percent of allowable TCE emissions to date is a time-weighted annual rolling average based on the 500 lb/year emission limit specified in the CRR-NY 212-2.2 Table 2. High Toxicity Air Contaminant List, revised April 1, 2017.

(4) TCE Mass Emission value of 7 lbs reported for the First Quarter was an incorrect typographical error and has been corrected to 37.6 lbs. The 12 month rolling average was accurate during the entire period.

(5) Carbon changeout for Tower 96 lead supplemental bed was completed on September 20, 2019.

(6) Third Quarter 2019 Vapor Sampling was conducted for both systems on October 3, 2019, after T96 system was brought back on-line following a condensate pump replacement.

µg/m^3	micrograms per cubic meter
lbs	pounds
CRR-NY	Codes, Rules and Regulations of the State of New York
ELAP	Environmental Laboratory Approval Program
NS	Not Sampled
NYSDOH	New York State Department of Health
SUP	Supplemental
TCE	Trichloroethylene
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
VPGAC	vapor phase granular activated carbon

Table 5D
Summary of TCE Mass Removal for 2019,
Operable Unit 2, Tower 102 Treatment System,
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Date	TCE Concentration ($\mu g/m^3$)[1]		TCE Mass Emission[2]		Percentage of Allowable TCE Emissions[3]
	T102 INFLUENT	T102 EFFLUENT	lbs	lbs/day	12 Month Rolling Average
12/7/2018	2,380	21	1.4	0.01	0.4%
2/13/2019	2,230	16	0.8	0.01	0.5%
6/13/2019	1,990	34	2.9	0.02	1.0%
10/3/2019 [4]	1,670	17	1.3	0.01	1.2%
12/27/2019	3,400	35	2.1	0.02	1.4%

Notes and Abbreviations:

(1) Vapor samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP-certified laboratory for VOC analyses per Modified USEPA Method TO-15.

(2) TCE Mass Emission calculated based on the exhaust air flow rate on the day of sampling and the period of time since the preceding sampling day.

TCE (lb) = TCE Concentration [$\mu g/m^3$] x Days x Flow Rate [ft^3/min] x (1 m^3/35 ft^3) x (60 min/hr) x (24 hr/day) x (0.000001 g/1 ug) x (0.0022 lb/g)

(3) Percent of allowable TCE emissions to date is a time-weighted annual rolling average based on the 500 lb/year emission limit specified in the CRR-NY 212-2.2 Table 2. High Toxicity Air Contaminant List, revised April 1, 2017.

(4) Third Quarter 2019 Vapor Sampling was conducted for both systems on October 3, 2019, after T96 system was brought back on-line following a condensate pump replacement.

$\mu g/m^3$	micrograms per cubic meter
lbs	pounds
ELAP	Environmental Laboratory Approval Program
NYSDOH	New York State Department of Health
TCE	trichloroethene
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

Table 6A
Summary of AERMOD Air Quality Impact Analysis,
Operable Unit 2, Tower 96 Treatment System,
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Constituent	CAS#	T96 Effluent (ug/m^3)	Emission Rate[1]			Scaled Impact - Hourly[2] (ug/m^3)	Scaled Impact - Annual[2] (ug/m^3)	SGC[3] (ug/m^3)	AGC[3] (ug/m^3)	%SGC	% AGC
		12/23/2019	lb/yr	lb/hr	g/s						
1,1 - Dichloroethane	00075-34-3	**11**	1.76	2.01E-04	2.53E-05	3.74E-03	1.10E-04	--	6.30E-01	--	0.02%
1,1 - Dichloroethene	00075-35-4	**36**	5.75	6.57E-04	8.27E-05	1.23E-02	3.60E-04	--	200	--	0.00%
Tetrachloroethene	00127-18-4	**1.5**	0.24	2.74E-05	3.45E-06	5.10E-04	1.50E-05	300	4	0.00%	0.00%
Trichloroethene[4]	00079-01-6	**79.0**	12.62	1.44E-03	1.82E-04	2.69E-02	7.89E-04	20	2.00E-01	0.13%	0.39%
Vinyl Chloride[4]	00075-01-4	**14**	2.24	2.55E-04	3.22E-05	4.76E-03	1.40E-04	180,000	1.10E-01	0.00%	0.13%
cis-1,2-Dichloroethene	00156-59-2	**74.9**	11.97	1.37E-03	1.72E-04	2.55E-02	7.48E-04	--	63	--	0.00%
trans-1,2-Dichloroethene	00156-60-5	**0.83**	0.13	1.51E-05	1.91E-06	2.82E-04	8.29E-06	--	63	--	0.00%
Benzene[4]	00071-43-2	**1.9**	0.30	3.47E-05	4.37E-06	6.47E-04	1.90E-05	1,300	1.30E-01	0.00%	0.01%
Toluene	00108-88-3	**32**	5.11	5.84E-04	7.36E-05	1.09E-02	3.20E-04	37,000	5,000	0.00%	0.00%
Xylene-o	01330-20-7	**0.31**	0.05	5.60E-06	7.05E-07	1.04E-04	3.06E-06	22,000	100		yes
Xylenes - m,p	01330-20-7	**0.52**	0.08	9.39E-06	1.18E-06	1.75E-04	5.14E-06	22,000	100		yes
Chloroethane	00078-93-14	**2.9**	0.46	5.29E-05	6.67E-06	9.87E-04	2.90E-05	--	10,000	--	0.00%
Chloroform	00078-93-15	**4.0**	0.64	7.30E-05	9.19E-06	1.36E-03	3.99E-05	150	15	0.00%	0.00%
Chloromethane	00078-93-16	**1.8**	0.29	3.28E-05	4.14E-06	6.13E-04	1.80E-05	22,000	90	0.00%	0.00%
Dichloromethane	00078-93-19	**0.94**	0.15	1.71E-05	2.16E-06	3.20E-04	9.39E-06	14,000	60	0.00%	0.00%
Trichlorotrifluoroethane (Freon 113)	00078-93-26	**1.8**	0.29	3.28E-05	4.14E-06	6.13E-04	1.80E-05	960,000	180,000	0.00%	0.00%

See Notes and Abbreviations on last page.

Table 6A
Summary of AERMOD Air Quality Impact Analysis,
Operable Unit 2, Tower 96 Treatment System,
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Notes and Abbreviations:

(1) Emission rate calculated based on effluent concentration and a stack air flow rate of 4,837 acfm. The stack air flow rate (in acfm) is taken from the actual stack air flow rate on 12/23/2019. Effluent temperature used in the model was 92°F from direct read in-line gauge.
Trichloroethene (lb/hr) = (720 ug/m^3) x (4,848 ft^3/min) x (1 m^3/35 ft^3) x (60 min/hr) x (0.000001 g/1 ug) x (0.0022 lb/g)
lb/yr = lb/hr x 8,760 hrs/yr
g/s = lb/hr x 1 hr/3,600 sec x 453.59 g/1 lb

(2) Ambient impact based on AERMOD modeling using normalized rate of 1 g/s is scaled to the actual emission rate of the pollutant. Modeling was performed using the representative meteorological data from the nearest station (Farmingdale, NY) for the years 2011 through 2015, and a stack which is 55 feet high and 20 inches in diameter. The maximum impact from all the years was used for the calculations.
Scaled hourly impact (ug/m^3) = AERMOD predicted hourly ambient impact at 1 g/s ([ug/m^3]/[g/s]) x Actual emission rate (g/s)
Scaled annual impact (ug/m^3) = AERMOD predicted annual ambient impact at 1 g/s ([ug/m^3]/[g/s]) x Actual emission rate (g/s)

AERMOD Normalized Ambient Impact at 1 g/s	
Hourly ([ug/m^3]/[g/s])	Annual ([ug/m^3]/[g/s])
148.05	4.35

(3) Short-term and annual guideline concentrations for air toxic pollutants specified in the NYSDEC DAR-1 AGC/SGC tables revised August 10, 2016.

(4) Vinyl Chloride and Benzene potential emission rates are less than 0.1 lb/hr and therefore below the trigger emissions for degree of air cleaning requirement (6 CRR-NY 212-2.3). TCE potential emissions are above the trigger limit and require a 12 month rolling average of annual emission to be maintained (see Table 5A) to demonstrate compliance with the 6 CRR-NY 212-2.2 500 lb/year requirement.

--	None Specified
1.5	bold value indicates a detection
acfm	actual cubic feet per minute
g/s	grams per second
µg/m^3	micrograms per cubic meter
lb/yr	pounds per year
lb/hr	pounds per hour
AGC	Annual Guideline Concentration
CAS #	Chemical Abstracts Service Registry Number
CRR-NY	New York Codes, Rules and Regulations
DAR-1	Division of Air Resources-1
NYSDEC	New York State Department of Environmental Conservation
SGC	Short-term Guideline Concentration

Table 6B
Summary of AERMOD Air Quality Impact Analysis,
Operable Unit 2, Tower 102 Treatment System,
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Constituent	CAS#	T102 Effluent ($\mu g/m^3$)	Emission Rate[1]			Scaled Impact - Hourly[2] ($\mu g/m^3$)	Scaled Impact - Annual[2] ($\mu g/m^3$)	SGC[3] ($\mu g/m^3$)	AGC[3] ($\mu g/m^3$)	%SGC	% AGC
		12/27/2019	lb/yr	lb/hr	g/s						
1,1,1 - Trichloroethane	00071-55-6	**0.82**	0.21	2.41E-05	3.03E-06	1.06E-03	6.93E-06	9,000	5,000	0.00%	0.00%
1,1 - Dichloroethane	00075-34-3	**28**	7.20	8.22E-04	1.04E-04	3.61E-02	2.37E-04	--	6.30E-01	--	0.04%
1,1 - Dichloroethene	00075-35-4	**63.0**	16.21	1.85E-03	2.33E-04	8.13E-02	5.33E-04	--	200	--	0.00%
Tetrachloroethene	00127-18-4	**6.4**	1.65	1.88E-04	2.37E-05	8.26E-03	5.41E-05	300	4	0.00%	0.00%
Trichloroethene[4]	00079-01-6	**35**	9.00	1.03E-03	1.29E-04	4.52E-02	2.96E-04	20	2.00E-01	0.23%	0.15%
Vinyl Chloride[4]	00075-01-4	**0.36**	0.09	1.06E-05	1.33E-06	4.65E-04	3.04E-06	180,000	1.10E-01	0.00%	0.00%
cis-1,2-Dichloroethene	00156-59-2	**47.6**	12.24	1.40E-03	1.76E-04	6.14E-02	4.02E-04	--	63	--	0.00%
trans-1,2-Dichloroethene	00156-60-5	**0.63**	0.16	1.85E-05	2.33E-06	8.13E-04	5.33E-06	--	63	--	0.00%
Chloroform	00067-66-3	**4.4**	1.13	1.29E-04	1.63E-05	5.68E-03	3.72E-05	150	14.7	0.00%	0.00%
Chloromethane	00074-87-3	**0.91**	0.23	2.67E-05	3.37E-06	1.17E-03	7.69E-06	22,000	90	0.00%	0.00%
Dichloromethane	00075-09-2	**0.73**	0.19	2.14E-05	2.70E-06	9.42E-04	6.17E-06	14,000	60	0.00%	0.00%
Trichlorotrifluoroethane (Freon 113)	00076-13-1	**43**	11.06	1.26E-03	1.59E-04	5.55E-02	3.64E-04	960,000	180,000	0.00%	0.00%

See Notes and Abbreviations on last page.

Table 6B
Summary of AERMOD Air Quality Impact Analysis,
Operable Unit 2, Tower 102 Treatment System,
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Notes and Abbreviations:

(1) Emission rate calculated based on effluent concentration and a stack air flow rate of 7,786 cfm. The stack air flow rate (in acfm) is taken from the actual stack air flow rate on 12/27/2019. Effluent temperature used in the model was 80°F from direct read in-line gauge.
Trichloroethene (lb/hr) = (21 ug/m^3) x (7,919 ft^3/min) x (1 m^3/35 ft^3) x (60 min/hr) x (0.000001 g/1 ug) x (0.0022 lb/g)
lb/yr = lb/hr x 8,760 hrs/yr
g/s = lb/hr x 1 hr/3,600 sec x 453.59 g/1 lb

(2) Ambient impact based on AERMOD modeling using noramalized rate of 1 g/s is scaled to the actual emission rate of the pollutant. Modeling was performed using the representative meteorological data from the nearest station (Farmingdale, NY) for the years 2011 through 2015, and a stack which is 69.52 feet high and 24 inches in diameter. The maximum impact from all the years was used for the calculations.
Scaled hourly impact (ug/m^3) = AERMOD predicted hourly ambient impact at 1 g/s ([ug/m^3]/[g/s]) x Actual emission rate (g/s)
Scaled annual impact (ug/m^3) = AERMOD predicted annual ambient impact at 1 g/s ([ug/m^3]/[g/s]) x Actual emission rate (g/s)

AERMOD Normalized Ambient Impact at 1 g/s	
Hourly ([ug/m^3]/[g/s])	Annual ([ug/m^3]/[g/s])
348.85	2.29

(3) Short-term and annual guideline concentrations for air toxic pollutants specified in the NYSDEC DAR-1 AGC/SGC tables revised August 10, 2016.
(4) Vinyl Chloride potential emission rate is less than 0.1 lb/hr and therefore below the trigger emissions for degree of air cleaning requirement (6 CRR-NY 212-2.3). TCE potential emissions are above the trigger limit and require a 12 month rolling average of annual emission to be maintained (see Table 5B) to demonstrate compliance with the 6 CRR-NY 212-2.2 500 lb/year requirement.

--	None Specified
0.82	bold value indicates a detection
acfm	actual cubic feet per minute
g/s	grams per second
µg/m^3	micrograms per cubic meter
lb/yr	pounds per year
lb/hr	pounds per hour
AGC	Annual Guideline Concentration
CAS #	Chemical Abstracts Service Registry Number
CRR-NY	New York Codes, Rules and Regulations
DAR-1	Division of Air Resources-1
NYSDEC	New York State Department of Environmental Conservation
SGC	Short-term Guideline Concentration

Table 7
Summary of SPDES Equivalency Effluent Water[1] Sample Analytical Results 2019,
Operable Unit 2 ONCT Treatment System,
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

PARAMETER	Units	Discharge Limit[2]	Location ID: Sample ID: Sample Date:	Outfall 005 Outfall 005 1/10/2019	Outfall 005 Outfall 005 2/14/2019	Outfall 005 Outfall 005 3/13/2019	Outfall 005 Outfall 005 4/3/2019	Outfall 005 Outfall 005 5/31/2019	Outfall 005 Outfall 005 6/28/2019
Volatile Organic Compounds (VOCs)[3]									
1,1,1-Trichloroethane (TCA)	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichlorotrifluoroethane (Freon 113)	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethene (1,1-DCE)	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
cis-1,2-dichloroethene	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene (PCE)	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
trans-1,2-dichloroethene	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Trichloroethene (TCE)	µg/L	5		**1.1**	**1.1**	**1.2**	**1.4**	**1.5**	**1.2**
Vinyl Chloride	µg/L	2		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
TVOCs[4]				**1.1**	**1.1**	**1.2**	**1.4**	**1.5**	**1.2**
Semivolatile Organic Compounds (SVOCs)[6]									
1,4-Dioxane	µg/L	NA / Monitor		**4.9**	**6.0**	**6.6**	**5.1**	**5.8**	**4.6**
Anions[5]									
Nitrogen, (Nitrate+Nitrite)	mg/L	NA		**4.0**	**4.0**	**4.0**	**4.2**	**4.4**	**4.7**
Nitrogen, Total Kjeldahl	mg/L	NA		<0.12	<0.12	<0.12	<0.12	<0.12	<0.14
Total Nitrogen	mg/L	10		**4.0**	**4.0**	**4.0**	**4.2**	**4.4**	**4.7**
pH - Intake (Tower 102)	S.U.	NA		5.3	5.2	5.1	5.0	5.0	5.3[7]
pH - Effluent	S.U.	5.0 - 8.5		6.3	5.8	6.2	6.0	6.7	6.7

See Notes and Abbreviations on last page.

Table 7
Summary of SPDES Equivalency Effluent Water[1] Sample Analytical Results 2019,
Operable Unit 2 ONCT Treatment System,
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

PARAMETER	Units	Discharge Limit[2]	Location ID: Sample ID: Sample Date:	Outfall 005 Outfall 005 7/22/2019	Outfall 005 Outfall 005 8/6/2019	Outfall 005 Outfall 005 9/4/2019	Outfall 005 Outfall 005 10/15/2019	Outfall 005 Outfall 005 11/20/2019	Outfall 005 Outfall 005 12/27/2019
Volatile Organic Compounds (VOCs)[3]									
1,1,1-Trichloroethane (TCA)	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichlorotrifluoroethane (Freon 113)	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethene (1,1-DCE)	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
cis-1,2-dichloroethene	µg/L	5		<0.50	<0.50	**0.29**	<0.50	<0.50	**0.34 J**
Methylene Chloride	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene (PCE)	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
trans-1,2-dichloroethene	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Trichloroethene (TCE)	µg/L	5		**1.2**	**1.2**	**1.5**	**1.5**	**1.4**	**1.4**
Vinyl Chloride	µg/L	2		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
TVOCs[4]				**1.2**	**1.2**	**1.5**	**1.5**	**1.4**	**1.7**
Semivolatile Organic Compounds (SVOCs)[6]									
1,4-Dioxane	µg/L	NA / Monitor		<0.24	**5.1**	**6.5**	**6.9**	**7.9**	**6.4**
Anions[5]									
Nitrogen, (Nitrate+Nitrite)	mg/L	NA		**4.0**	**4.1**	**4.4**	**4.2**	**4.4**	**4.4**
Nitrogen, Total Kjeldahl	mg/L	NA		<0.14	<0.14	<0.14	<0.14	**0.15 J**	<0.14
Total Nitrogen	mg/L	10		**4.0**	**4.1**	**4.4**	**4.2**	**4.6**	**4.4**
pH - Intake (Tower 102)	S.U.	NA		5.1	5.2	5.2	5.3	5.2	4.9
pH - Effluent	S.U.	5.0 - 8.5		6.3	6.2	6.6	6.3	6.7	5.9

Notes and Abbreviations on last page.

Table 7
Summary of SPDES Equivalency Effluent Water[1] Sample Analytical Results 2019,
Operable Unit 2 ONCT Treatment System,
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

PARAMETER	Units	Discharge Limit[2]	Location ID: Sample ID: Sample Date:	Outfall 006 Outfall 006 1/10/2019	Outfall 006 Outfall 006 2/14/2019	Outfall 006 Outfall 006 3/13/2019	Outfall 006 Outfall 006 4/2/2019	Outfall 006 Outfall 006 5/31/2019	Outfall 006 Outfall 006 6/28/2019
Volatile Organic Compounds (VOCs)[3]									
1,1,1-Trichloroethane (TCA)	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichlorotrifluoroethane (Freon 113)	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethene (1,1-DCE)	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
cis-1,2-dichloroethene	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene (PCE)	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
trans-1,2-dichloroethene	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Trichloroethene (TCE)	µg/L	5		**0.59**	**0.65**	**0.69**	<0.50	**0.46 J**	<0.50
Vinyl Chloride	µg/L	2		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
TVOCs[4]				0.0	**0.65**	**0.69**	0.0	**0.46**	0.0
Semivolatile Organic Compounds (SVOCs)[6]									
1,4-Dioxane	µg/L	NA / Monitor		**6.7**	**6.5**	**9.3**	**8.8**	**8.1**	**6.6**
Anions[5]									
Nitrogen, (Nitrate+Nitrite)	mg/L	NA		**4.5**	**4.3**	**4.5**	**4.7**	**4.7**	**5.5**
Nitrogen, Total Kjeldahl	mg/L	NA		<0.12	<0.12	<0.12	<0.12	<0.12	<0.14
Total Nitrogen	mg/L	10		**4.5**	**4.3**	**4.5**	**4.7**	**4.7**	**5.5**
pH - Intake (Tower 96)	S.U.	NA		5.3	5.2	5.3	5.0	5.5	5.2[7]
pH - Effluent	S.U.	5.0 - 8.5		6.3	6.5	6.3	6.7	6.3	6.3

Notes and Abbreviations on last page.

Table 7
Summary of SPDES Equivalency Effluent Water[1] Sample Analytical Results 2019,
Operable Unit 2 ONCT Treatment System,
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

PARAMETER	Units	Discharge Limit[2]	Location ID: Sample ID: Sample Date:	Outfall 006 Outfall 006 7/23/2019	Outfall 006 Outfall 006 8/6/2019	Outfall 006 Outfall 006 9/4/2019	Outfall 006 Outfall 006 10/15/2019	Outfall 006 Outfall 006 11/15/2019	Outfall 006 Outfall 006 12/23/2019
Volatile Organic Compounds (VOCs)[3]									
1,1,1-Trichloroethane (TCA)	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichlorotrifluoroethane (Freon 113)	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethene (1,1-DCE)	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
cis-1,2-dichloroethene	µg/L	5		<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50
Methylene Chloride	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene (PCE)	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
trans-1,2-dichloroethene	µg/L	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Trichloroethene (TCE)	µg/L	5		<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50
Vinyl Chloride	µg/L	2		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
TVOCs[4]				0.0	0.0	**0.00**	0.0	0.0	0.00
Semivolatile Organic Compounds (SVOCs)[6]									
1,4-Dioxane	µg/L	NA / Monitor		**10**	**8.2**	**10**	**9.0**	**6.8**	**10.0**
Anions[5]									
Nitrogen, Nitrate+Nitrite	mg/L	NA		**4.5**	**4.7**	**4.8**	**4.7**	**4.8**	**5.5**
Nitrogen, Total Kjeldahl	mg/L	NA		<0.14	<0.14	<0.14	<0.14	**0.47**	<0.14
Total Nitrogen	mg/L	10		**4.5**	**4.7**	**4.8**	**4.7**	**5.3**	**5.5**
pH - Intake (Tower 96)	mg/L	NA		5.2	5.2	5.2	5.3	5.2	4.8
pH - Effluent	mg/L	5.0 - 8.5		6.4	6.5	6.7	6.7	6.7	6.3

Notes and Abbreviations on last page.

Table 7
Summary of SPDES Equivalency Effluent Water[1], Sample Analytical Results 2019
Operable Unit 2, ONCT Treatment System,
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Notes and Abbreviations:

(1) SPDES effluent water samples are collected at a point closest to the respective Outfalls to each of the recharge basins, not directly from the treatment system tower effluent ports.
(2) Discharge limits are per the SPDES permit equivalency, dated October 12, 2017, amended on July 30, 2018 and transmitted by the NYSDEC to Northrop Grumman on August 9, 2018.
(3) Samples were analyzed for permit specified VOCs using USEPA Method 624.
(4) TVOC represents the sum of individual concentrations of VOCs detected. Results rounded to two significant figures.
(5) Samples were analyzed for Nitrogen, (Nitrate+Nitrite) and Total Kjeldahl Nitrogen (TKN) by USEPA Methods 353.2 and 351.2, respectively. Total Nitrogen is calculated as the sum of Nitrogen, (Nitrate+Nitrite) and TKN concentrations and is rounded to two significant figures.
(6) A SPEDES equivalency letter was issued October 2017, at that time 1,4-Dioxane was added to the analyte list. Discussion regarding pH and other analytes are ongoing with NYSDEC, Basin Discharges are still being reported under SPDES Permit.
(7) Field measurements of well pH taken by hand held meter on June 13, 2019 during quarterly sampling event, were used herin due to meter malfunction on SPDES sample date. The pH of Influent to the air stripper for Outfall 005 is estimated from the Well 17, Well 18, Well 19 values. The pH of Influent to the air stripper for Outfall 006 is estimated from the Well 1 and Well 3R.

-- Not Analyzed
0.67 Value indicates a detection
< 0.50 Compound not detected above its laboratory quantification limit
µg/L micrograms per liter
mg/L milligrams per liter
J Constituent value is estimated
DUP Field Duplicate Sample
NA Not Applicable
ONCT On-Site Containment System
SPDES State Pollution Discharge Elimination System
S.U. Standard Units
SVOCs Semivolatile Organic Compounds
USEPA United States Environmental Protection Agency
VOCs Volatile Organic Compounds

Table 8
OU2 Water-Level Measurement Results and Remedial
Well Specific Capacities, April 2 to April 11, 2019
Northrop Grumman Systems Corporation,
Bethpage, New York

Well Identification	Measuring Point Elevation (ft msl)	Depth to Water (ft bmp)	Water-Level Elevation (ft msl)
Shallow Wells[1]			
FW-03	124.30	54.29	70.01
N-9921 [2]	94.23	NM	NM
N-10597	109.85	38.84	71.01
N-10600	102.41	36.36	66.05
N-10631	103.47	36.64	66.83
N-10633	103.80	38.76	65.04
N-10634	101.20	38.33	62.87
N-10821 [2]	91.58	NM	NM
GM-15SR	109.35	43.50	65.85
GM-15I	109.29	43.25	66.04
GM-16SR	115.86	NM	NM
GM-16I	115.81	NM	NM
GM-17I	115.83	41.75	74.08
GM-17SR	115.79	41.50	74.29
GM-18S	107.60	38.73	68.87
GM-18I	109.03	39.89	69.14
GM-19I	109.86	42.49	67.37
GM-19S	109.86	41.95	67.91
GM-20I	103.88	34.95	68.93
GM-21I	105.72	37.64	68.08
GM-21S	105.81	36.15	69.66
GM-74I	107.42	40.19	67.23
GM-78S	104.94	38.65	66.29
GM-78I	105.06	38.95	66.11
GM-79S (N-10628)	100.88	38.10	62.78
HN-24S	122.73	50.12	72.61
HN-29I	116.42	45.02	71.40
HN-40S	116.35	47.45	68.90
HN-40I	115.91	47.24	68.67
HN-42S	120.32	49.99	70.33
HN-42I	119.61	49.37	70.24
MW-3R	101.45	32.81	68.64
Intermediate Wells[1]			
N-10624	93.61	29.91	63.70
GM-13D	113.97	43.95	70.02
HN-24I	125.80	50.63	75.17
HN-29D	115.11	45.32	69.79
GM-79I	101.09	38.43	62.66

See Notes and Abbreviations on Last Page

Table 8
OU2 Water-Level Measurement Results and Remedial
Well Specific Capacities, April 2 to April 11, 2019
Northrop Grumman Systems Corporation,
Bethpage, New York

Well Identification	Measuring Point Elevation (ft msl)	Depth to Water (ft bmp)	Water-Level Elevation (ft msl)
Deep Wells[1]			
N-10627	93.70	30.31	63.39
GM-15D	109.84	45.19	64.65
GM-17D	115.68	46.63	69.05
GM-18D	108.88	42.89	65.99
GM-20D	103.92	36.88	67.04
GM-21D	105.66	41.35	64.31
GM-34D	71.19	11.73	59.46
GM-36D	91.63	32.24	59.39
GM-37D	97.26	36.42	60.84
GM-37D2	97.17	37.01	60.16
GM-38D	91.75	35.80	55.95
GM-39D$_A$[3]	102.23	36.62	65.61
GM-39D$_B$[3]	102.08	39.21	62.87
GM-70D2	99.58	38.89	60.69
GM-73D	104.87	41.59	63.28
GM-74D	107.43	43.28	64.15
GM-78D	103.81	41.15	62.66
GM-79D	101.25	39.33	61.92
BPOW 1-1	73.65	23.50	50.15
BPOW 1-2	73.54	27.61	45.93
BPOW 1-3	71.92	27.94	43.98
BPOW 1-4	56.68	9.79	46.89
BPOW 2-1	58.64	16.49	42.15
Deep2 Wells[2]			
GM-15D2	109.78	47.05	62.73
GM-21D2	104.62	46.01	58.61
GM-33D2	106.85	46.51	60.34
GM-34D2	71.19	13.19	58.00
GM-35D2	96.28	37.04	59.24
GM-36D2	91.60	34.60	57.00
GM-38D2	91.56	38.41	53.15
GM-71D2	98.45	38.78	59.67
GM-73D2	104.62	43.33	61.29
GM-73D3	103.88	43.52	60.36
GM-74D2	107.36	49.27	58.09
GM-74D3	106.56	46.96	59.60
GM-75D2	93.63	32.89	60.74
GM-78D2	103.82	43.05	60.77
MW 3-1	115.28	55.35	59.93

See Notes and Abbreviations on Last Page

Table 8
OU2 Water-Level Measurement Results and Remedial
Well Specific Capacities, April 2 to April 11, 2019
Northrop Grumman Systems Corporation,
Bethpage, New York

Well Identification	Measuring Point Elevation (ft msl)	Depth to Water (ft bmp)	Water-Level Elevation (ft msl)
Deep2 Wells[1] (continued)			
Well 1	116.78	84.25	32.53
Well 3R[4]	115.28	86.75	28.53
Well 17	104.10	61.50	42.60
Well 18	110.00	67.15	42.85
Well 19	108.70	58.35	50.35
BPOW 1-5	56.75	11.15	45.60
BPOW 1-6	57.06	11.59	45.47
BPOW 2-2	58.50	16.78	41.72
BPOW 2-3	57.98	15.99	41.99
BPOW 3-1	61.43	22.63	38.80
BPOW 3-2	61.82	24.34	37.48
BPOW 3-3	60.64	19.92	40.72
BPOW 3-4	62.44	21.71	40.73
BPOW 4-1R[5]	67.34	23.46	43.88
BPOW 4-2R[5]	67.18	23.52	43.66
RE109D1	100.03	41.39	58.64
RE109D2	100.15	41.63	58.52
RE109D3	100.40	41.58	58.82
RE123D1[6]	105.49	44.21	61.28
RE123D2[6]	106.11	45.58	60.53
RE123D3[6]	105.92	42.66	63.26
RE126D1[6]	101.03	45.99	55.04
RE126D2[6]	101.39	42.11	59.28
RE126D3[6]	101.10	42.80	58.30

Remedial Well Specific Capacities[7]

Well ID	Static Depth to Water (ft bmp)[8]	Pumping Depth to Water (ft bmp)	Drawdown (ft)	Second Quarter 2019 Pumping Rate (Q)(gpm)[8]	Specific Capacity (Q/s)(gpm/ft)
Well 1	52.90	84.25	31.35	797	25.41
Well 3R	54.80	86.75	31.95	714	22.35
Well 17	42.00	61.50	19.50	1002	51.38
Well 18	47.00	67.15	20.15	818	40.57
Well 19	49.00	58.35	9.35	511	54.65

See Notes and Abbreviations on Last Page

Table 8
OU2 Water-Level Measurement Results and Remedial
Well Specific Capacities, April 2 to April 11, 2019
Northrop Grumman Systems Corporation,
Bethpage, New York

Notes and Abbreviations:

(1) Well identification (e.g., GM-70D2) does not necessarily designate the actual hydrogeologic zone. Determination of the hydrogeologic zones is based on the well screen interval and the regional model layering.

(2) Well was not accessible as drill rig was staged on top of well location

(3) Monitoring wells were voluntarily monitored to enhance coverage in the Deep and Deep2 zones.

(4) Surveyed elevation not available, elevation is estimated from topographic map of the area.

(5) The NAVY abandoned original Wells BPOW4-1 and BPOW4-2 and installed replacement Wells BPOW4-1R and BPOW4-2R between August, 2014 and October, 2014.

(5) Water level data for this well was collected by Navy on June 7, 2019 and was provided to Arcadis

(7) Specific capacity values are qualitative in nature, due to fluctuations in static water levels. Sharp declines in specific capacity could indicate the need for well redevelopment.

(8) Static Water Level measurements for Well 1 and Well 3R were obtained on August 28, 2018. Water level measurer for Well 17and Well 18 were obtained September 17, 2014. Water level measurement for Well 19 was obtained August 8, 2017.

(9) Pumping rate determined at time of pumping depth to water measurement.

ft bmp feet below measuring point
ft msl feet relative to mean sea level
gpm gallons per minute
NM not measured
OU2 Operable Unit 2
Q pumping rate
S drawdown

Table 9
OU2 Water-Level Measurement Results and Remedial
Well Specific Capacities, December 17 to December 19, 2019
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Well Identification	Measuring Point Elevation (ft msl)	Depth to Water (ft btmp)	Water-Level Elevation (ft msl)
Shallow Wells[1]			
FW-03	124.30	53.60	70.70
N-9921[2]	94.23	NM	NM
N-10597	109.85	38.83	71.02
N-10600[2]	102.41	36.51	65.90
N-10631	103.47	36.84	66.63
N-10633	103.80	38.11	65.69
N-10634	101.20	37.95	63.25
N-10821	91.58	NM	NM
GM-15SR	109.35	42.65	66.70
GM-15I	109.29	42.40	66.89
GM-16SR	115.86	45.17	70.69
GM-16I	115.81	45.05	70.76
GM-17I	115.83	42.71	73.12
GM-17SR	115.79	42.10	73.69
GM-18S	107.60	40.30	67.30
GM-18I	109.03	40.10	68.93
GM-19S	109.86	40.85	69.01
GM-19I	109.86	41.85	68.01
GM-20I	103.88	35.72	68.16
GM-21S	105.81	37.20	68.61
GM-21I	105.72	38.19	67.53
GM-74I	107.42	39.30	68.12
GM-78S	104.94	39.00	65.94
GM-78I	105.06	39.28	65.78
GM-79S (N-10628)	100.88	36.99	63.89
HN-24S	122.73	NM	NM
HN-40S	116.35	47.02	69.33
HN-40I	115.91	46.79	69.12
HN-42S	120.32	49.27	71.05
HN-42I	119.61	48.56	71.05
MW-3R	101.45	33.60	67.85
PZ-ONCT-1	103.97	31.75	72.22
PZ-ONCT-2	105.42	34.34	71.08
PZ-ONCT-4	105.9	37.37	68.53
PZ-ONCT-5	106.71	38.36	68.35
PZ-ONCT-6	106.43	37.85	68.58
PZ-ONCT-7	105.67	36.40	69.27
PZ-ONCT-8	106.76	52.90	53.86
PZ-ONCT-9	104.63	39.15	65.48
PZ-PLT5-1	118.29	42.85	75.44
PZ-PLT5-2	117.29	46.63	70.66
PZ-PLT5-3	115.96	42.85	73.11
PZ-PLT5-4	115.11	43.40	71.71
PZ-PLT5-5	113.22	43.17	70.05
PZ-PLT5-6	114.81	44.67	70.14
Intermediate Wells[1]			
N-10624	93.61	29.45	64.16
GM-13D	113.97	43.62	70.35
HN-24I	125.80	49.33	76.47
HN-29D	115.11	44.49	70.62
GM-79I	101.09	37.75	63.34

See Notes and Abbreviations on Last Page

Table 9
OU2 Water-Level Measurement Results and Remedial
Well Specific Capacities, December 17 to December 19, 2019
Northrop Grumman Systems Corporation,
Bethpage, New York

Well Identification	Measuring Point Elevation (ft msl)	Depth to Water (ft bmp)	Water-Level Elevation (ft msl)
Deep Wells[1]			
N-10627	93.70	30.40	63.30
GM-15D	109.84	44.75	65.09
GM-17D	115.68	46.82	68.86
GM-18D	108.88	43.08	65.80
GM-20D	103.92	37.28	66.64
GM-21D	105.66	41.55	64.11
GM-34D	71.19	11.87	59.32
GM-36D	91.63	32.00	59.63
GM-37D	97.26	36.27	60.99
GM-37D2	97.17	36.99	60.18
GM-38D	91.75	36.30	55.45
GM-39D$_A$[3]	102.23	36.93	65.30
GM-39D$_B$[3]	102.08	39.62	62.46
GM-70D2	99.58	38.69	60.89
GM-73D	104.87	42.16	62.71
GM-74D	107.43	43.36	64.07
GM-78D	103.81	41.55	62.26
GM-79D	101.25	39.10	62.15
BPOW 1-1	73.65	27.11	46.54
BPOW 1-2	73.54	27.71	45.83
BPOW 1-3	71.92	27.89	44.03
BPOW 1-4	56.68	9.83	46.85
BPOW 2-1	58.64	17.12	41.52
Deep2 Wells[1]			
GM-15D2	109.78	47.00	62.78
GM-21D2	104.62	46.83	57.79
GM-33D2	106.85	47.20	59.65
GM-34D2	71.19	14.02	57.17
GM-35D2	96.28	38.00	58.28
GM-36D2	91.60	35.35	56.25
GM-38D2	91.56	38.90	52.66
GM-71D2	98.45	39.10	59.35
GM-73D2	104.62	44.18	60.44
GM-73D3	103.88	44.17	59.71
GM-74D2	107.36	50.61	56.75
GM-74D3	106.56	47.58	58.98
GM-75D2	93.63	33.09	60.54
GM-78D2	103.82	43.60	60.22
MW 3-1	115.28	55.48	59.80
Well 1	116.78	81.35	35.43
Well 3R[4]	115.28	85.20	30.08
Well 17	104.10	63.10	41.00
Well 18	110.00	71.20	38.80
Well 19	108.70	55.72	52.98

See Notes and Abbreviations on Last Page

Table 9
OU2 Water-Level Measurement Results and Remedial
Well Specific Capacities, December 17 to December 19, 2019
Northrop Grumman Systems Corporation,
Bethpage, New York

Well Identification	Measuring Point Elevation (ft msl)	Depth to Water (ft bmp)	Water Level Elevation (ft msl)
Deep2 Wells[1] (continued)			
BPOW 1-5	56.75	10.46	46.29
BPOW 1-6	57.06	10.93	46.13
BPOW 3-4	62.44	21.75	40.69
BPOW 2-2	58.50	17.26	41.24
BPOW 2-3	57.98	NM	57.98
BPOW 3-1	61.43	22.85	38.58
BPOW 3-2	61.82	24.15	37.67
BPOW 3-3	60.64	19.95	40.69
BPOW 4-1R[5]	67.34	20.67	46.67
BPOW 4-2R[5]	67.18	22.40	44.78
Deep2 Wells[1]			
RE109D1	100.03	42.21	57.82
RE109D2	100.15	42.54	57.61
RE109D3	100.40	42.50	57.90
RE123D1[6]	105.49	45.32	60.17
RE123D2[6]	106.11	46.55	59.56
RE126D1[6]	101.03	46.22	54.81
RE126D2[6]	101.39	43.13	58.26
RE126D3[6]	101.10	43.75	57.35
RE123D3[6]	105.92	43.54	62.38

Remedial Well Specific Capacities [7]

Well ID	Static Depth to Water (ft bmp) [8]	Pumping Depth to Water (ft bmp)	Drawdown (ft)	Fourth Quarter 2019 Pumping Rate (Q)(gpm) [9]	Specific Capacity (Q/s)(gpm/ft)
Well 1	52.90	81.35	28.45	805	28.55
Well 3R	54.80	85.20	30.40	709	21.88
Well 17	42.00	63.10	21.10	1100	48.03
Well 18	47.00	71.20	24.20	1023	40.43
Well 19	49.00	55.72	6.72	513	52.78

Notes and Abbreviations:

(1) Well identification (e.g., GM-70D2) does not necessarily designate the actual hydrogeologic zone. Determination of the hydrogeologic zones is based on the well screen interval and the regional model layering.

(2) Well N-9921 was not accessible due to soil re-grading activities on the road median that covered the well.

(3) Monitoring wells were voluntarily monitored to enhance coverage in the Deep and Deep2 zones.

(4) Surveyed elevation not available, elevation is estimated from topographic maps of the area.

(5) The NAVY abandoned original Wells BPOW4-1 and BPOW4-2 and installed replacement Wells BPOW4-1R and BPOW4-2R between August, 2014 and October, 2014.

(6) Water level data for this well was collected by Navy on December 18, 2019 and was provided to Arcadis

(7) Specific capacity values are qualitative in nature, due to fluctuations in static water levels. Sharp declines in specific capacity could indicate the need for well redevelopment.

(8) Static Water Level measurements for Well 1 and Well 3R were obtained on August 28, 2018. Water level measurements for V and Well 18 were obtained September 17, 2014. Water level measurement for Well 19 was obtained August 8, 2017.

(9) Pumping rate determined at time of pumping depth to water measurement.

ft bmp feet below measuring point
ft msl feet relative to mean sea level
gpm gallons per minute
NM not measured
OU2 Operable Unit 2
Q pumping rate
S drawdown

Table 10
Summary of Volatile Organic Compound Concentrations in Groundwater
Upgradient of OU2 ONCT System.
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Constituents units in (ug/L)	Zone:	Shallow					Intermediate	Deep
	Well ID[1]	FW-03	HN-40S	HN-40I	HN-42S	HN-42I	HN-24I	GM-13D
	Sample ID:	FW-03	HN-40S	HN-40I	HN-42S	HN-42I	HN-24I	GM-13D
	Sample Date:	10/14/2019	4/15/2019	4/15/2019	4/12/2019	4/12/2019	5/2/2019	5/13/2019
	NYSDEC SCGs (ug/L)[2]							
1,1,1-Trichloroethane	5	**1.3**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-trichloro-1,2,2-trifluoroethane	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	**0.90 J**	< 1.0	< 1.0	< 1.0	< 1.0	**0.65 J**	**2.4**
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**2.3**
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**3.9**
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloromethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m&p-Xylenes	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl N-Butyl Ketone (2-Hexanone)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	**2.3**	< 1.0	**0.94 J**	< 1.0	< 1.0	**4.9**	**38.2**
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5	**2.8**	< 1.0	**1.1**	< 1.0	< 1.0	**6.5**	**17.6**
Vinyl chloride	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TVOCs		7.3	0.0	2.0	0.0	0.0	12	64

See Notes and Abbreviations on Last Page

Table 10
Summary of Volatile Organic Compound Concentrations in Groundwater
Upgradient of OU2 ONCT System.
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Notes and Abbreviations:

(1) Well identification (e.g., GM-13D) does not necessarily designate the actual hydrogeologic zone. Determination of the hydrogeologic zone is based on the well screen interval and the regional model layering.

(2) Standards, Criteria, and Guidance (SCG) values based on documents referenced in the Groundwater Feasibility Study Report (ARCADIS Geraghty & Miller, Inc. 2000) that are based on the NYSDEC TOGs (NYSDEC 1998); most stringent values are listed.

Results for the program are validated at 20% frequency, per protocols specified in OU2 Groundwater Monitoring Plan (Arcadis 2016).

Samples analyzed for the TCL VOCs using USEPA Method 8260C.

TVOCs are rounded to two significant figures.

Bold value indicates a detection.

< 5.0	Compound not detected above its laboratory quantification limit.
µg/L	micrograms per Liter
J	Value is estimated concentration
NYSDEC	New York State Department of Environmental Conservation
OU2	Operable Unit 2
TCL	Target Compound List
TOGs	Technical and Operational Guidance Series
TVOCs	Total Volatile Organic Compounds (known lab contaminants acetone, 2-butanone, and methylene chloride are not included in calculation of TVOCs)
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds
	Compound detected in exceedance of NYSDEC SCG Criteria

Table 11
Summary of Volatile Organic Compound Concentrations in Groundwater
Proximate to OU2 ONCT System.
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Constituents units in (ug/L)	Zone Well ID[1] Sample ID Sample Date	Shallow GM-15SR GM-15SR 5/17/2019	Shallow GM-15SR GM-15SR 10/23/2019	Shallow GM-15I GM-15I 5/20/2019	Shallow GM-15I GM-15I 10/23/2019	Shallow GM-17I GM-17I 5/2/2019	Shallow GM-17I GM-17I 10/1/2019	Shallow GM-18I GM-18I 4/30/2019	Shallow GM-18I GM-18I 10/4/2019	Shallow GM-21S GM-21S 4/17/2019	Shallow GM-20I GM-20I 4/25/2019	Shallow GM-74I GM-74I 11/18/2019	Shallow GM-78S GM-78S 4/23/2019	Shallow GM-78I GM-78I 4/22/2019	Shallow N-10631 N-10631 5/1/2019	Shallow N-10631 N-10631 10/15/2019
	NYSDEC SCG (ug/L)[2]															
1,1,1-Trichloroethane	5	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-trichloro-1,2,2-trifluoroethane	5	< 5.0	< 0.50	< 5.0	< 0.50	< 5.0	< 0.50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	5	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	**0.78 J**	**0.54**	< 1.0	< 0.50 J	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloromethane	5	< 2.0	< 0.50	< 2.0	< 0.50	< 2.0	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m&p-Xylenes	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl N-Butyl Ketone (2-Hexanone)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0	< 5.0 J	< 5.0	< 5.0
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5	< 1.0	**4.4**	**2.2**	**3.9**	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	**0.68 J**	**0.76 J**	< 1.0	**0.69 J**	**0.78 J**	**0.68 J**
Vinyl chloride	2	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TVOCs		**0.78**	**4.9**	**2.2**	**3.9**	0.0	0.0	0.0	0.0	0.0	**0.68**	**0.76**	0.0	**0.69**	**0.78**	**0.68**

See Notes and Abbreviations on Last Page

Table 11
Summary of Volatile Organic Compound Concentrations in Groundwater
Proximate to OU2 ONCT System.
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Constituents units in (ug/L)	Zone Well ID[1] Sample ID Sample Date	Intermediate GM-21I GM-21I 4/30/2019	Deep GM-15D GM-15D 5/21/2019	Deep GM-15D GM-15D 10/23/2019	Deep GM-17D GM-17D 5/2/2019	Deep GM-17D GM-17D 10/1/2019	Deep GM-18D GM-18D 4/24/2019	Deep GM-18D GM-18D 10/4/2019	Deep GM-20D GM-20D 4/25/2019	Deep GM-20D GM-20D 9/10/2019	Deep GM-20D GM-20D 11/13/2019	Deep GM-21D GM-21D 4/24/2019	Deep GM-39DA GM-39DA 4/25/2019	Deep GM-39DA GM-39DA 10/9/2019	Deep GM-39DB GM-39DB 4/25/2019
	NYSDEC SCG (ug/L)[2]														
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-trichloro-1,2,2-trifluoroethane	5	< 5.0	< 5.0	< 0.50	< 5.0	< 0.50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	5	< 1.0	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10 J	< 10	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0 J	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0 J	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	< 1.0	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	< 1.0	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloromethane	5	< 2.0	< 2.0	< 0.50	< 2.0	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m&p-Xylenes	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl N-Butyl Ketone (2-Hexanone)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	< 1.0	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5	< 1.0	< 1.0	**0.35 J**	< 1.0	< 0.50 J	**0.94 J**	**0.65 J**	**0.55 J**	**0.54 J**	< 1.0	**1.2**	**0.67 J**	**1.6**	**40.2**
Vinyl chloride	2	< 1.0	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TVOCs		0.0	0.0	0.35	0.0	0.0	0.94	0.65	0.55	0.54	0.0	1.2	0.67	1.6	40

See Notes and Abbreviations on Last Page

Table 11
Summary of Volatile Organic Compound Concentrations in Groundwater
Proximate to OU2 ONCT System.
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Constituents units in (ug/L)	Zone Well ID[1] Sample ID Sample Date	Deep GM-39DB GM-39DB 10/9/2019	Deep GM-73D GM-73D 4/22/2019	Deep GM-73D GM-73D 10/8/2019	Deep GM-74D GM-74D 4/24/2019	Deep GM-74D GM-74D 10/7/2019	Deep GM-78D GM-78D 4/30/2019	Deep GM-78D GM-78D 10/10/2019	Deep 2 GM-15D2 GM-15D2 5/21/2019	Deep 2 GM-15D2 GM-15D2 10/23/2019	Deep 2 GM-21D2 GM-21D2 3/11/2019	Deep 2 GM-21D2 REP031119DC1 3/11/2019	Deep 2 GM-21D2 GM-21D2 6/25/2019
	NYSDEC SCG (ug/L)[2]												
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-trichloro-1,2,2-trifluoroethane	5	< 5.0	< 5.0	< 0.50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**0.53**	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	5	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	**0.61 J**	**0.45 J**	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.23 J**	< 1.0	< 1.0	< 1.0
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloromethane	5	< 2.0	< 2.0	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50	< 2.0	< 2.0	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m&p-Xylenes	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl N-Butyl Ketone (2-Hexanone)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	**2.4**	**2.5**	**1.0**	**1.0**	**1.2**
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5	**43.3**	**15.4**	**7.3**	**1.2**	**1.1**	**1.3**	**1.1**	**6.8**	**6.5**	**8.5**	**8.3**	**6.5**
Vinyl chloride	2	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0
TVOCs		43	15	7.3	1.2	1.1	1.3	1.1	9.8	10.	9.5	9.3	7.7

See Notes and Abbreviations on Last Page

Table 11
Summary of Volatile Organic Compound Concentrations in Groundwater
Proximate to OU2 ONCT System.
Northrop Grumman Systems Corporation,
Bethpage, New York

Constituents units in (ug/L)	Zone Well ID[1] Sample ID Sample Date	Deep 2 GM-21D2 GM-21D2 9/10/2019	Deep 2 GM-21D2 REP091019DC 9/10/2019	Deep 2 GM-21D2 GM-21D2 11/13/2019	Deep 2 GM-21D2 REP111319CK1 11/13/2019	Deep 2 GM-33D2 GM-33D2 3/13/2019	Deep 2 GM-33D2 GM-33D2 6/26/2019	Deep 2 GM-33D2 GM-33D2 9/11/2019	Deep 2 GM-33D2 GM-33D2 10/15/2019	Deep 2 GM-73D2 GM-73D2 4/22/2019	Deep 2 GM-73D2 GM-73D2 10/8/2019	Deep 2 GM-73D3 GM-73D3 4/24/2019	Deep 2 GM-73D3 GM-73D3 10/8/2019	Deep 2 GM-74D2 GM-74D2 4/23/2019
	NYSDEC SCG (ug/L)[2]													
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-trichloro-1,2,2-trifluoroethane	5	< 5.0	< 5.0	< 5.0	< 5.0	**2.9 J**	< 5.0	< 5.0	**2.1 J**	< 5.0	< 0.50	< 5.0	< 0.50	< 5.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50 J	< 1.0	< 0.50	< 1.0
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	50	< 10	< 10	< 10 J	< 10 J	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0 J	< 2.0 J	< 2.0	< 2.0	< 2.0 J	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50 J	< 1.0	< 0.50	< 1.0
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloromethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50	< 2.0	< 0.50	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m&p-Xylenes	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl N-Butyl Ketone (2-Hexanone)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	**1.0**	**0.98 J**	**1.0**	**1.1**	**1.1**	< 1.0	< 1.0	**1.1**	**2.1**	**1.6**	< 1.0	**1.5**	< 1.0
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5	**7.0**	**7.2**	**5.8**	**6.1**	**11.9**	**7.2**	**7.3**	**9.6**	**33.7**	**29.6**	**1.6**	**1.8**	**2.8**
Vinyl chloride	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0
TVOCs		8	8.2	6.8	7.2	16	7.2	7.3	13	36	31	1.6	3.3	2.8

See Notes and Abbreviations on Last Page

Table 11
Summary of Volatile Organic Compound Concentrations in Groundwater
Proximate to OU2 ONCT System.
Northrop Grumman Systems Corporation,
Bethpage, New York

Constituents units in (ug/L)	Zone Well ID[1] Sample ID Sample Date	Deep 2 GM-74D2 GM-74D2 10/7/2019	Deep 2 GM-74D3 GM-74D3 4/23/2019	Deep 2 GM-74D3 GM-74D3 10/7/2019	Deep 2 GM-78D2 GM-78D2 4/30/2019	Deep 2 GM-78D2 GM-78D2 10/10/2019	Deep 2 MW-3-1 MW-3-1 5/2/2019	Deep 2 MW-3-1 MW-3-1 10/3/2019	Deep 2 MW-3-1 REP100319TD1 10/3/2019
	NYSDEC SCG (ug/L)[2]								
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-trichloro-1,2,2-trifluoroethane	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	**0.61 J**	< 1.0	< 1.0	< 1.0	< 1.0	**3.0**	**1.4**	**1.3**
1,1-Dichloroethene	5	**0.64 J**	< 1.0	< 1.0	< 1.0	< 1.0	**2.8**	**1.6**	**1.6**
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10 J	< 10 J
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.56 J**	< 1.0	< 1.0
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**19.2**	**13.2**	**13.1**
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloromethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m&p-Xylenes	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl N-Butyl Ketone (2-Hexanone)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	**1.9**	**3.0**	**4.7**	< 1.0	< 1.0	**46.1**	**57.4**	**55.5**
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5	**6.7**	**5.3**	**5.9**	**0.89 J**	**0.81 J**	**229 D**	**230 D**	**229 D**
Vinyl chloride	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**8.0**	**4.9**	**4.5**
TVOCs		10	8.3	11	0.89	0.81	310	310	310

See Notes and Abbreviations on Last Page

Table 11
Summary of Volatile Organic Compound Concentrations in Groundwater
Proximate to OU2 ONCT System.
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Notes and Abbreviations:

(1) Well identification (e.g., GM-21I) does not necessarily designate the actual hydrogeologic zone. Determination of the hydrogeologic zone is based on the well screen interval and the regional model layering.

(2) Standards, Criteria, and Guidance (SCG) values based on documents referenced in the Groundwater Feasibility Study Report (ARCADIS Geraghty & Miller, Inc. 2000) that are based on the NYSDEC TOGs (NYSDEC 1998); most stringent values are listed.

Results for the program are validated at 20% frequency, per protocols specified in OU2 Groundwater Monitoring Plan (Arcadis 2016.)

Samples analyzed for the TCL VOCs using USEPA Method 8260C.

TVOCs are rounded to two significant figures.

Bold value indicates a detection.

< 5.0	Compound not detected above its laboratory quantification limit.
µg/L	micrograms per Liter
J	Value is estimated concentration
NYSDEC	New York State Department of Environmental Conservation
OU2	Operable Unit 2
TCL	Target Compound List
TOGs	Technical and Operational Guidance Series
TVOCs	Total Volatile Organic Compounds (known lab contaminants acetone, 2-butanone, and methylene chloride are not included in calculation of TVOCs)
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds
	Compound detected in exceedance of NYSDEC SCG Criteria

Table 12
Summary of Volatile Organic Compound Concentrations in Groundwater
Downgradient of the OU2 ONCT System.
Northrop Grumman Systems Corporation,
Bethpage, New York.

ARCADIS Design & Consultancy for natural and built assets

Constituents	Zone:	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
	Well ID[1]:	BPOW 1-1 [4]	BPOW 1-1 [4]	GM-79I [3]	GM-79I [3]	N-10624 [3]	BPOW 1-2 [3]	BPOW 1-2 [4]	BPOW 1-3 [4]	BPOW 1-3 [4]	BPOW 1-4 [4]	BPOW 1-4 [4]	GM-34D [3]	GM-34D [3]
units in (ug/L)	Sample ID:	BPOW 1-1	BPOW 1-1	GM-79I	GM-79I	N-10624	BPOW 1-2	BPOW 1-2	BPOW 1-3	BPOW 1-3	BPOW 1-4	BPOW 1-4	GM-34D	GM-34D
	Sample Date:	5/29/2019	10/16/2019	5/7/2019	10/10/2019	5/1/2019	5/29/2019	10/16/2019	5/29/2019	10/16/2019	6/4/2019	10/18/2019	5/23/2019	10/3/2019
	NYSDEC SCGs (ug/L)[2]													
1,1,1-Trichloroethane	5	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	5	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
1,1,2-trichloro-1,2,2-trifluoroethane	5	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 5.0
1,1,2-Trichloroethane	5	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
1,1-Dichloroethane	5	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
1,1-Dichloroethene	5	< 0.50	**0.20 J**	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**1.3**	**0.86 J**
1,2-Dichloroethane	5	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
1,2-Dichloropropane	5	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
2-Butanone (MEK)	50	< 5.0	< 5.0	< 10	< 10	< 10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 10	< 10
4-Methyl-2-Pentanone	50	< 2.0	< 2.0	< 5.0	< 5.0	< 5.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 5.0
Acetone	50	< 5.0	< 5.0	< 10	< 10	< 10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Bromoform	50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Bromomethane	5	< 0.50	< 0.50	< 2.0	< 2.0	< 2.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 2.0	< 2.0
Carbon Disulfide	50	< 0.50	< 0.50	< 2.0	< 2.0	< 2.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 2.0	< 2.0
Carbon Tetrachloride	5	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Chlorobenzene	5	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Chlorodibromomethane	5	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Chloroethane	5	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Chloroform	7	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Chloromethane	5	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**6.1**	**4.3**
cis-1,3-Dichloropropene	5	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Dichloromethane	5	< 0.50	< 0.50	< 2.0	< 2.0	< 2.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 2.0	< 2.0
Ethylbenzene	5	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
m&p-Xylenes	5	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Methyl N-Butyl Ketone (2-Hexanone)	50	< 2.0	< 2.0	< 5.0	< 5.0	< 5.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 5.0
o-Xylene	5	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Styrene (Monomer)	5	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Tetrachloroethene	5	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**5.9**	**6.8**
Toluene	5	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
trans-1,3-Dichloropropene	5	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Trichloroethene	5	**0.80**	**0.80**	< 1.0	< 1.0	**0.83 J**	**0.39 J**	**0.38 J**	< 0.50	< 0.50	< 0.50	< 0.50	**186**	**159**
Vinyl chloride	2	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
TVOCs		0.80	1.0	0.0	0.0	**0.83**	0.39	0.38	0.0	0.0	0.0	0.0	**200**	**170**

See Notes and Abbreviations on Last Page

Table 12
Summary of Volatile Organic Compound Concentrations in Groundwater
Downgradient of the OU2 ONCT System.
Northrop Grumman Systems Corporation,
Bethpage, New York.

Constituents	Zone:	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep		Deep 2	Deep 2	Deep 2
	Well ID[1]:	GM-36D [3]	GM-37D [3]	GM-37D2 [3]	GM-38D [3]	GM-38D [3] REP042919ALH1	GM-38D [3]	GM-70D2 [3]	GM-79D [3]	GM-79D [3]	N-10627 [3]		BPOW 1-5 [4]	BPOW 1-5 [4]	BPOW 1-6 [4]
	Sample ID:	GM-36D	GM-37D	GM-37D2	GM-38D	4/29/2019	GM-38D	GM-70D2	GM-79D	GM-79D	N-10627		BPOW 1-5	BPOW 1-5	BPOW 1-6
units in (ug/L)	Sample Date:	5/21/2019	5/3/2019	5/3/2019	4/29/2019		10/2/2019	5/3/2019	5/7/2019	10/10/2019	5/1/2019		5/31/2019	10/18/2019	6/4/2019
	NYSDEC SCGs (ug/L)[2]														
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
1,1,2-trichloro-1,2,2-trifluoroethane	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0		< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	5	< 1.0	< 1.0	**1.4**	< 1.0	**0.58 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	5	< 1.0	< 1.0	**0.73 J**	**0.66 J**	**0.67 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	**0.94 J**	**1.0**	**0.78 J**	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
2-Butanone (MEK)	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10		< 5.0	< 5.0	< 5.0
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0		< 2.0	< 2.0	< 2.0
Acetone	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10		< 5.0	< 5.0	< 5.0
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50		< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0		< 0.50	< 0.50	< 0.50
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0		< 0.50	< 0.50	< 0.50
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
Chlorodibromomethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
Chloroform	7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
cis-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	**0.85 J**	**0.85 J**	**0.60 J**	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
Dichloromethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0		< 0.50	< 0.50	< 0.50
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
m&p-Xylenes	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
Methyl N-Butyl Ketone (2-Hexanone)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0		< 2.0	< 2.0	< 2.0
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
Tetrachloroethene	5	< 1.0	< 1.0	**0.95 J**	**3.4**	**3.4**	**3.1**	**2.6**	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
Trichloroethene	5	< 1.0	**10.7**	**2.5**	**118**	**119**	**104**	**6.6**	**20.5**	**15.8**	< 1.0		< 0.50	< 0.50	< 0.50
Vinyl chloride	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 0.50	< 0.50	< 0.50
TVOCs		0.0	11	5.6	120	130	110	9.2	20.	16	0.0		0.0	0.0	0.0

See Notes and Abbreviations on Last Page

Table 12
Summary of Volatile Organic Compound Concentrations in Groundwater
Downgradient of the OU2 ONCT System.
Northrop Grumman Systems Corporation,
Bethpage, New York.

Constituents units in (ug/L)	Zone: Well ID[1]: Sample ID: Sample Date:	Deep 2 BPOW 1-6 [4] REP060419RM1 6/4/2019	Deep 2 BPOW 1-6 [4] BPOW 1-6 10/21/2019	Deep 2 BPOW 2-1 [4] BPOW 2-1 2/18/2019	Deep 2 BPOW 2-1 [4] BPOW 2-1 5/30/2019	Deep 2 BPOW 2-1 [4] BPOW 2-1 9/9/2019	Deep 2 BPOW 2-1 [4] BPOW 2-1 10/21/2019	Deep 2 BPOW 2-2 [4] BPOW 2-2 2/18/2019	Deep 2 BPOW 2-2 [4] BPOW 2-2 5/30/2019	Deep 2 BPOW 2-2 [4] BPOW 2-2 9/9/2019	Deep 2 BPOW 2-2 [4] BPOW 2-2 10/21/2019	Deep 2 BPOW 2-3 [4] BPOW 2-3 2/18/2019	Deep 2 BPOW 2-3 [4] BPOW 2-3 5/30/2019
	NYSDEC SCGs (ug/L)[2]												
1,1,1-Trichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
1,1,2,2-Tetrachloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
1,1,2-trichloro-1,2,2-trifluoroethane	5	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0 J
1,1,2-Trichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
1,1-Dichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
1,1-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
1,2-Dichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
1,2-Dichloropropane	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
2-Butanone (MEK)	50	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0	< 5.0	< 5.0	< 5.0 J
4-Methyl-2-Pentanone	50	< 2.0	< 2.0	< 2.0	< 2.0 J	< 2.0	< 2.0	< 2.0	< 2.0 J	< 2.0	< 2.0	< 2.0	< 2.0 J
Acetone	50	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0	< 5.0	< 5.0	< 5.0 J
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
Bromodichloromethane	50	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
Bromoform	50	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
Bromomethane	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
Carbon Disulfide	50	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
Carbon Tetrachloride	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
Chlorobenzene	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
Chlorodibromomethane	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
Chloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
Chloroform	7	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
Chloromethane	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
cis-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
cis-1,3-Dichloropropene	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
Dichloromethane	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
Ethylbenzene	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
m&p-Xylenes	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
Methyl N-Butyl Ketone (2-Hexanone)	50	< 2.0	< 2.0	< 2.0	< 2.0 J	< 2.0	< 2.0	< 2.0	< 2.0 J	< 2.0	< 2.0	< 2.0	< 2.0 J
o-Xylene	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
Styrene (Monomer)	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
Tetrachloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
Toluene	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
trans-1,3-Dichloropropene	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
Trichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
Vinyl chloride	2	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50 J
TVOCs		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

See Notes and Abbreviations on Last Page

Table 12
Summary of Volatile Organic Compound Concentrations in Groundwater
Downgradient of the OU2 ONCT System.
Northrop Grumman Systems Corporation,
Bethpage, New York.

Constituents units in (ug/L)	Zone: Well ID[1]: Sample ID: Sample Date:	Deep 2 BPOW 2-3 [4] BPOW 2-3 9/12/2019	Deep 2 BPOW 2-3 [4] BPOW 2-3 10/21/2019	Deep 2 BPOW 3-1 [4] BPOW 3-1 6/4/2019	Deep 2 BPOW 3-1 [4] BPOW 3-1 10/22/2019	Deep 2 BPOW 3-2 [4] BPOW 3-2 6/4/2019	Deep 2 BPOW 3-2 [4] BPOW 3-2 10/22/2019	Deep 2 BPOW 3-3 [4] BPOW 3-3 6/3/2019	Deep 2 BPOW 3-3 [4] BPOW 3-3 10/22/2019	Deep 2 BPOW 3-4 [4] BPOW 3-4 6/3/2019	Deep 2 BPOW 3-4 [4] BPOW 3-4 10/22/2019	Deep 2 BPOW 3-4 [4] REP102219ARH1 10/22/2019	Deep 2 BPOW 4-1R [4] BPOW 4-1R 5/28/2019
	NYSDEC SCGs (ug/L)[2]												
1,1,1-Trichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**0.33 J**	**0.38 J**	**0.37 J**	< 0.50
1,1,2,2-Tetrachloroethane	5	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-trichloro-1,2,2-trifluoroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**3.0**	**3.2**	**3.1**	**24.6**
1,1,2-Trichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**1.0**	**1.1**	**1.1**	< 0.50
1,1-Dichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**0.44 J**	**0.50**	**0.49 J**	< 0.50
1,1-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**4.0**	**3.9**	**3.9**	**0.75**
1,2-Dichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Butanone (MEK)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
4-Methyl-2-Pentanone	50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Acetone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromoform	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromomethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon Disulfide	50	< 0.50	< 0.50	**0.20 J**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50 B	< 0.50 B	< 0.50
Carbon Tetrachloride	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**1.8**	**2.3**	**2.2**	< 0.50
Chlorobenzene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorodibromomethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroform	7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**1.3**	**1.2**	**1.3**	**0.58**
Chloromethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**1.8**	**1.9**	**1.9**	**0.24 J**
cis-1,3-Dichloropropene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dichloromethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Ethylbenzene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Methyl N-Butyl Ketone (2-Hexanone)	50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
o-Xylene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene (Monomer)	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**154 D**	**156 D**	**161 D**	**0.62**
Vinyl chloride	2	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
TVOCs		0.0	0.0	**0.20**	0.0	0.0	0.0	0.0	0.0	170	170	180	27

See Notes and Abbreviations on Last Page

Table 12
Summary of Volatile Organic Compound Concentrations in Groundwater
Downgradient of the OU2 ONCT System.
Northrop Grumman Systems Corporation,
Bethpage, New York.

Constituents units in (ug/L)	Zone: Well ID[1]: Sample ID: Sample Date:	Deep 2 BPOW 4-1R[4] BPOW 4-1R 10/25/2019	Deep 2 BPOW 4-2R[4] BPOW 4-2R 5/24/2019	Deep 2 BPOW 4-2R[4] BPOW 4-2R 10/24/2019	Deep 2 GM-34D2[3] GM-34D2 5/23/2019	Deep 2 GM-34D2[3] GM-34D2 10/24/2019	Deep 2 GM-35D2[3] GM-35D2 5/6/2019	Deep 2 GM-35D2[3] GM-35D2 10/9/2019	Deep 2 GM-38D2[3] GM-38D2 4/29/2019	Deep 2 GM-38D2[3] GM-38D2 10/2/2019	Deep 2 GM-71D2[3] GM-71D2 5/6/2019	Deep 2 GM-75D2[3] GM-75D2 3/13/2019	Deep 2 GM-75D2[3] GM-75D2 6/26/2019
	NYSDEC SCGs (ug/L)[2]												
1,1,1-Trichloroethane	5	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	**0.58 J**	**1.3**	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	5	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-trichloro-1,2,2-trifluoroethane	5	**30.7**	**6.7**	**18.8**	< 5.0	< 0.50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	5	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	**4.5**	**5.2**	**4.0**	< 1.0	< 1.0
1,1-Dichloroethene	5	**0.80**	**0.39 J**	**0.51**	< 1.0	< 0.50 J	< 1.0	< 1.0	**0.99 J**	**1.2**	**2.7**	< 1.0	< 1.0
1,2-Dichloroethane	5	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 5.0	< 5.0	< 5.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
4-Methyl-2-Pentanone	50	< 2.0	< 2.0	< 2.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	50	< 5.0	< 5.0	< 5.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	**0.61**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 0.50	< 0.50	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0 J	< 2.0
Carbon Disulfide	50	< 0.50	< 0.50	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	**0.30 J**	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	5	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	**0.23 J**	< 0.50	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	**0.82 J**	**0.94 J**	< 1.0	< 1.0	< 1.0
Chloromethane	5	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	**0.31 J**	< 0.50	**0.17 J**	**1.5**	**1.5**	< 1.0	< 1.0	**0.67 J**	**0.55 J**	< 1.0	< 1.0	< 1.0
cis-1,3-Dichloropropene	5	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloromethane	5	< 0.50	< 0.50	< 0.50	< 2.0	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	5	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m&p-Xylenes	5	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl N-Butyl Ketone (2-Hexanone)	50	< 2.0	< 2.0	< 2.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	5	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene (Monomer)	5	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	< 0.50	< 0.50	**0.49 J**	**6.3**	**5.0**	**3.2**	**3.4**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	5	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene	5	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5	**1.1**	**0.96**	**2.2**	**95.7**	**76.2**	**24.9**	**21.3**	**21.9**	**11.8**	**10.9**	**20.4**	**18.0**
Vinyl chloride	2	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TVOCs		33	8	22	100	83	28	25	29	20.	19	20.	18

See Notes and Abbreviations on Last Page

Table 12
Summary of Volatile Organic Compound Concentrations in Groundwater
Downgradient of the OU2 ONCT System.
Northrop Grumman Systems Corporation,
Bethpage, New York.

Constituents units in (ug/L)	Zone: Well ID[1]: Sample ID: Sample Date:	Deep 2 GM-75D2 [2] GM-75D2 9/11/2019	Deep 2 GM-75D2 [3] GM-75D2 11/13/2019
	NYSDEC SCGs (ug/L)[2]		
1,1,1-Trichloroethane	5	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0
1,1,2-trichloro-1,2,2-trifluoroethane	5	< 5.0	< 5.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0
1,1-Dichloroethene	5	< 1.0	< 1.0
1,2-Dichloroethane	5	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10	< 10
4-Methyl-2-Pentanone	50	< 5.0	< 5.0
Acetone	50	< 10	< 10 J
Benzene	1	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0
Chlorodibromomethane	5	< 1.0 J	< 1.0
Chloroethane	5	< 1.0	< 1.0
Chloroform	7	< 1.0	< 1.0
Chloromethane	5	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	< 1.0	< 1.0
cis-1,3-Dichloropropene	5	< 1.0	< 1.0
Dichloromethane	5	< 2.0	< 2.0
Ethylbenzene	5	< 1.0	< 1.0
m&p-Xylenes	5	< 1.0	< 1.0
Methyl N-Butyl Ketone (2-Hexanone)	50	< 5.0	< 5.0
o-Xylene	5	< 1.0	< 1.0
Styrene (Monomer)	5	< 1.0	< 1.0
Tetrachloroethene	5	< 1.0	< 1.0
Toluene	5	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 1.0	< 1.0
trans-1,3-Dichloropropene	5	< 1.0	< 1.0
Trichloroethene	5	**15.8**	**17.0**
Vinyl chloride	2	< 1.0	< 1.0
TVOCs		16	17

See Notes and Abbreviations on Last Page

Table 12
Summary of Volatile Organic Compound Concentrations in Groundwater
Downgradient of the OU2 ONCT System.
Northrop Grumman Systems Corporation,
Bethpage, New York.

Notes and Abbreviations:

(1) Well identification (e.g., GM-34D) does not necessarily designate the actual hydrogeologic zone. Determination of the hydrogeologic zone is based on the well screen interval and the regional model layering.

(2) Standards, Criteria, and Guidance (SCG) values based on documents referenced in the Groundwater Feasibility Study Report (ARCADIS Geraghty & Miller, Inc. 2000) that are based on the NYSDEC TOGs (NYSDEC 1998); most stringent values are listed.

(3) Samples were analyzed using USEPA Method 8260C

(4) Samples were analyzed using USEPA Method 524.2

Results for the program are validated at 20% frequency, per protocols specified in OU2 Groundwater MonitoringPlan (Arcadis 2016)

Samples analyzed for the TCL VOCs using USEPA Method 8260C.

TVOCs are rounded to two significant figures.

Bold value indicates a detection.

< 5.0	Compound not detected above its laboratory quantification limit.
µg/L	micrograms per liter
D	Concentration is based on a diluted sample analysis
J	Value is estimated concentration.
NYSDEC	New York State Department of Environmental Conservation
OU2	Operable Unit 2
REP	Blind duplicate sample
TCL	Target Compound List
TOGs	Technical and Operational Guidance Series
TVOCs	Total Volatile Organic Compounds (known lab contaminants acetone, 2-butanone, and methylene chloride are not included in calculation of TVOCs)
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds
	Compound detected in exceedance of NYSDEC SCG Criteria

Table 13
Summary of Metals Concentrations in Groundwater
Proximate to Former Northrop Grumman Plants 1 and 2
Northrop Grumman Systems Corporation,
Bethpage, New York.

ARCADIS Design & Consultancy for natural and built assets

Constituent (units in ug/L)	Well ID[1]; Sample ID; Sample Date	GM-15SR GM-15SR 5/17/2019	GM-15SR GM-15SR 10/23/2019	GM-78I GM-78I 4/22/2019	GM-78S GM-78S 4/23/2019	MW-01GF MW-01GF 5/8/2019	MW-01GF REP050819ALH1 5/8/2019
	NYSDEC SCGs (ug/L)[2]						
Cadmium (Total)	5	--	--	< 3.0	< 3.0	< 3.0	< 3.0
Cadmium (Dissolved)	5	--	--	< 3.0	< 3.0	< 3.0	< 3.0
Chromium (Total)	50	**488**	**498**	< 10	< 10	< 10	< 10
Chromium (Dissolved)	50	**502**	**430**	< 10	< 10	< 10	< 10

See Notes and Abbreviations on Last Page

Table 13
Summary of Metals Concentrations in Groundwater
Proximate to Former Northrop Grumman Plants 1 and 2
Northrop Grumman Systems Corporation,
Bethpage, New York.

ARCADIS Design & Consultancy for natural and built assets

Constituent (units in ug/L)	Well ID[1]: Sample ID: Sample Date:	MW-01GF MW-01GF 10/2/2019	MW-02GF MW-02GF 5/9/2019	MW-02GF MW-02GF 10/2/2019	N-10631 N-10631 5/1/2019	N-10631 N-10631 10/15/2019	PLT1 MW-04 PLT1 MW-04 5/8/2019
	NYSDEC SCGs (ug/L)[2]						
Cadmium (Total)	5	< 3.0	< 3.0	< 3.0	**8.3**	**4.4**	--
Cadmium (Dissolved)	5	< 3.0	< 3.0	< 3.0	**6.4**	< 3.0	--
Chromium (Total)	50	< 10	**290**	**232**	**54.1**	< 10	< 10
Chromium (Dissolved)	50	< 10	**326**	**234**	**12.1**	< 10	< 10

See Notes and Abbreviations on Last Page

Table 13
Summary of Metals Concentrations in Groundwater
Proximate to Former Northrop Grumman Plants 1 and 2
Northrop Grumman Systems Corporation,
Bethpage, New York.

ARCADIS Design & Consultancy for natural and built assets

Constituent (units in ug/L)	Well ID[1]: Sample ID: Sample Date:	PLT1 MW-04 PLT1 MW-04 10/11/2019	PLT1 MW-05 PLT1 MW-05 5/9/2019	PLT1 MW-05 PLT1 MW-05 10/11/2019	PLT1 MW-05 REP101119CK1 10/11/2019	PLT1 MW-06 PLT1 MW-06 5/8/2019	PLT1 MW-06 PLT1 MW-06 10/11/2019
	NYSDEC SCGs (ug/L)[2]						
Cadmium (Total)	5	--	--	--	--	--	--
Cadmium (Dissolved)	5	--	--	--	--	--	--
Chromium (Total)	50	< 10	**866**	**779**	**782**	**106**	**147**
Chromium (Dissolved)	50	< 10	**862**	**783**	**769**	**104**	**147**

See Notes and Abbreviations on Last Page

Table 13
Summary of Metals Concentrations in Groundwater
Proximate to Former Northrop Grumman Plants 1 and 2
Northrop Grumman Systems Corporation,
Bethpage, New York.

ARCADIS Design & Consultancy for natural and built assets

Notes and Abbreviations:

(1) Well identification (e.g., GM-15SR) does not necessarily designate the actual hydrogeologic zone. Determination of the hydrogeologic zone is based on the well screen interval and the regional model layering.

(2) Standards, Criteria, and Guidance (SCG) values based on documents referenced in the Groundwater Feasibility Study Report (ARCADIS Geraghty & Miller, Inc. 2000) that are based on the NYSDEC TOGs (NYSDEC 1998); most stringent values listed.

Samples analyzed for total unfiltered and filtered Cadium and Chromium using USEPA Method 6010C; Total indicates unfiltered sample and Dissolved indicates filtered sample.

Results for the program are validated at 20% frequency, per protocols specified in OU2 Groundwater Monitoring Plan (Arcadis 2016).

Bold value indicates a detection

--	Not analyzed
< 3.0	Compound not detected above its laboratory quantification limit
µg/L	Micrograms per liter
NYSDEC	New York State Department of Environmental Conservation
OU2	Operable Unit 2
REP	Blind Duplicate Sample
TOGs	Technical Operational and Guidance Series
USEPA	United States Environmental Protection Agency
	Compound detected in exceedance of NYSDEC SCG Criteria

Table 14
Summary of 1,4-Dioxane Concentrations in OU2 Groundwater
Northrop Grumman Systems Corporation,
Bethpage, New York.

ARCADIS Design & Consultancy for natural and built assets

Well ID	Sample ID	Sample Date	1,4-Dioxane (g/L)	Hydrogeologic Zones
BPOW 1-1	BPOW 1-1	5/29/2019	< 0.250 B	DEEP
BPOW 1-1	BPOW 1-1	10/16/2019	**0.130 J**	DEEP
BPOW 1-2	BPOW 1-2	5/29/2019	< 0.200 B	DEEP
BPOW 1-2	BPOW 1-2	10/16/2019	< 0.200	DEEP
BPOW 1-3	BPOW 1-3	5/29/2019	< 0.312 B	DEEP
BPOW 1-3	BPOW 1-3	10/16/2019	**0.106 J**	DEEP
BPOW 1-4	BPOW 1-4	6/4/2019	< 0.352 B	DEEP
BPOW 1-4	BPOW 1-4	10/18/2019	**0.104 J**	DEEP
BPOW 1-5	BPOW 1-5	5/31/2019	< 0.200 B	DEEP 2
BPOW 1-5	BPOW 1-5	10/18/2019	< 0.200	DEEP 2
BPOW 1-6	BPOW 1-6	6/4/2019	< 0.301 BJ	DEEP 2
BPOW 1-6	REP060419RM1	6/4/2019	< 0.282 B	DEEP 2
BPOW 1-6	BPOW 1-6	10/21/2019	< 0.200	DEEP 2
BPOW 2-1	BPOW 2-1	2/18/2019	**0.644**	DEEP
BPOW 2-1	BPOW 2-1	5/30/2019	< 0.792 BJ	DEEP
BPOW 2-1	BPOW 2-1	9/9/2019	**1.22**	DEEP
BPOW 2-1	BPOW 2-1	10/21/2019	**0.797**	DEEP
BPOW 2-2	BPOW 2-2	2/18/2019	**0.475**	DEEP 2
BPOW 2-2	BPOW 2-2	5/30/2019	< 0.536 BJ	DEEP 2
BPOW 2-2	BPOW 2-2	9/9/2019	**0.738**	DEEP 2
BPOW 2-2	BPOW 2-2	10/21/2019	**0.641**	DEEP 2
BPOW 2-3	BPOW 2-3	2/18/2019	**3.19**	DEEP 2
BPOW 2-3	BPOW 2-3	5/30/2019	< 3.57 B	DEEP 2
BPOW 2-3	BPOW 2-3	9/12/2019	**3.9**	DEEP 2
BPOW 2-3	BPOW 2-3	10/21/2019	**3.89**	DEEP 2
BPOW 3-1	BPOW 3-1	6/4/2019	< 1.14 B	DEEP 2
BPOW 3-1	BPOW 3-1	10/22/2019	**0.699**	DEEP 2
BPOW 3-2	BPOW 3-2	6/4/2019	**4.66**	DEEP 2
BPOW 3-2	BPOW 3-2	10/22/2019	**3.75**	DEEP 2
BPOW 3-3	BPOW 3-3	6/3/2019	**5.44**	DEEP 2
BPOW 3-3	BPOW 3-3	10/22/2019	**6.8**	DEEP 2
BPOW 3-4	BPOW 3-4	6/3/2019	**6.5**	DEEP 2
BPOW 3-4	BPOW 3-4	10/22/2019	**6.7**	DEEP 2
BPOW 3-4	REP102219ARH1	10/22/2019	**6.14**	DEEP 2
BPOW 4-1R	BPOW 4-1R	5/28/2019	**3.32**	DEEP 2
BPOW 4-1R	BPOW 4-1R	10/25/2019	**4.05**	DEEP 2
BPOW 4-2R	BPOW 4-2R	5/24/2019	< 0.789 B	DEEP 3
BPOW 4-2R	BPOW 4-2R	10/24/2019	**2.14**	DEEP 3
FW-03	FW-03	10/14/2019	**0.13 J**	SHALLOW
GM-13D	GM-13D	5/13/2019	**2.8**	INTERMEDIATE
GM-15D	GM-15D	5/21/2019	**0.087 J**	DEEP
GM-15D	GM-15D	10/23/2019	< 0.24	DEEP
GM-15D2	GM-15D2	5/21/2019	**3.3**	DEEP 2

Footnotes on last page

Table 14
Summary of 1,4-Dioxane Concentrations in OU2 Groundwater
Northrop Grumman Systems Corporation,
Bethpage, New York.

ARCADIS Design & Consultancy for natural and built assets

Well ID	Sample ID	Sample Date	1,4-Dioxane (g/L)	Hydrogeologic Zones
GM-15D2	GM-15D2	10/23/2019	**3.4**	DEEP 2
GM-15I	GM-15I	5/20/2019	**0.11 J**	SHALLOW
GM-15I	GM-15I	10/23/2019	**0.27**	SHALLOW
GM-15SR	GM-15SR	5/17/2019	**0.21 J**	SHALLOW
GM-15SR	GM-15SR	10/23/2019	**0.11 J**	SHALLOW
GM-17D	GM-17D	5/2/2019	**6.7**	DEEP
GM-17D	GM-17D	10/1/2019	**8.1**	DEEP
GM-17I	GM-17I	5/2/2019	**6.3**	SHALLOW
GM-17I	GM-17I	10/1/2019	**6.3**	SHALLOW
GM-18D	GM-18D	4/24/2019	**10**	DEEP
GM-18D	GM-18D	10/4/2019	**9.8**	DEEP
GM-18I	GM-18I	4/30/2019	**4.5**	SHALLOW
GM-18I	GM-18I	10/4/2019	**5**	SHALLOW
GM-20D	GM-20D	4/25/2019	**4.3**	DEEP
GM-20I	GM-20I	4/25/2019	**4.1**	SHALLOW
GM-21D	GM-21D	4/24/2019	**4.1**	DEEP
GM-21D2	GM-21D2	6/25/2019	**4.6**	DEEP 2
GM-21D2	GM-21D2	11/13/2019	**6.1**	DEEP 2
GM-21D2	REP111319CK1	11/13/2019	**5.4**	DEEP 2
GM-21I	GM-21I	4/30/2019	**4.8**	SHALLOW
GM-21S	GM-21S	4/17/2019	**5.4**	SHALLOW
GM-33D2	GM-33D2	6/26/2019	**13**	DEEP 2
GM-33D2	GM-33D2	10/15/2019	**13**	DEEP 2
GM-34D	GM-34D	5/23/2019	**13**	DEEP
GM-34D	GM-34D	10/3/2019	**14**	DEEP
GM-34D2	GM-34D2	5/23/2019	**9.6**	DEEP 2
GM-34D2	GM-34D2	10/24/2019	**12**	DEEP 2
GM-35D2	GM-35D2	5/6/2019	**7.3 B**	DEEP 2
GM-35D2	GM-35D2	10/9/2019	**7.5**	DEEP 2
GM-36D	GM-36D	5/21/2019	**0.96**	DEEP
GM-37D	GM-37D	5/3/2019	**0.55 B**	DEEP
GM-37D2	GM-37D2	5/3/2019	**0.76 B**	DEEP
GM-38D	GM-38D	4/29/2019	**3.2**	DEEP
GM-38D	REP042919ALH1	4/29/2019	**3.1**	DEEP
GM-38D	GM-38D	10/2/2019	**3.8**	DEEP
GM-38D2	GM-38D2	4/29/2019	**2.2**	DEEP 2
GM-38D2	GM-38D2	10/2/2019	**2.6**	DEEP 2
GM-39DA	GM-39DA	4/25/2019	**4.4**	DEEP
GM-39DA	GM-39DA	10/9/2019	**5.3**	DEEP
GM-39DB	GM-39DB	4/25/2019	**2.8**	DEEP
GM-39DB	GM-39DB	10/9/2019	**4.3**	DEEP
GM-70D2	GM-70D2	5/3/2019	**6.8 B**	DEEP
GM-71D2	GM-71D2	5/6/2019	**2.3 B**	DEEP 2

Footnotes on last page

Table 14
Summary of 1,4-Dioxane Concentrations in OU2 Groundwater
Northrop Grumman Systems Corporation,
Bethpage, New York.

ARCADIS Design & Consultancy for natural and built assets

Well ID	Sample ID	Sample Date	1,4-Dioxane (g/L)	Hydrogeologic Zones
GM-73D	GM-73D	4/22/2019	**2.9**	DEEP
GM-73D	GM-73D	10/8/2019	**2.4**	DEEP
GM-73D2	GM-73D2	4/22/2019	**2.1**	DEEP 2
GM-73D2	GM-73D2	10/8/2019	**2**	DEEP 2
GM-73D3	GM-73D3	4/24/2019	**0.83**	DEEP 2
GM-73D3	GM-73D3	10/8/2019	**1**	DEEP 2
GM-74D	GM-74D	4/24/2019	**5**	DEEP
GM-74D	GM-74D	10/7/2019	**4.9**	DEEP
GM-74D2	GM-74D2	4/23/2019	**2.2**	DEEP 2
GM-74D2	GM-74D2	10/7/2019	**3.2**	DEEP 2
GM-74D3	GM-74D3	4/23/2019	**1.9**	DEEP 2
GM-74D3	GM-74D3	10/7/2019	**2.3**	DEEP 2
GM-74I	GM-74I	11/18/2019	**5.5**	SHALLOW
GM-75D2	GM-75D2	6/26/2019	**6**	DEEP 2
GM-75D2	GM-75D2	11/13/2019	**7.0 J**	DEEP 2
GM-78D	GM-78D	4/30/2019	**8.8**	DEEP
GM-78D	GM-78D	10/10/2019	**12**	DEEP
GM-78D2	GM-78D2	4/30/2019	**12**	DEEP 2
GM-78D2	GM-78D2	10/10/2019	**14**	DEEP 2
GM-78I	GM-78I	4/22/2019	**8.7**	SHALLOW
GM-78S	GM-78S	4/23/2019	**4.6**	SHALLOW
GM-79D	GM-79D	5/7/2019	**5.5**	DEEP
GM-79D	GM-79D	10/10/2019	**5.5**	DEEP
GM-79I	GM-79I	5/7/2019	**5**	INTERMEDIATE
GM-79I	GM-79I	10/10/2019	**5.6**	INTERMEDIATE
HN-24I	HN-24I	5/2/2019	**0.81**	INTERMEDIATE
HN-40I	HN-40I	4/15/2019	< 0.25	SHALLOW
HN-40S	HN-40S	4/15/2019	< 0.24	SHALLOW
HN-42I	HN-42I	4/12/2019	**0.48**	SHALLOW
HN-42S	HN-42S	4/12/2019	< 0.25	SHALLOW
MW-01GF	MW-01GF	5/8/2019	**7.6**	SHALLOW
MW-01GF	REP050819ALH1	5/8/2019	**6.3**	SHALLOW
MW-01GF	MW-01GF	10/2/2019	**6.2**	SHALLOW
MW-02GF	MW-02GF	5/9/2019	**12**	SHALLOW
MW-02GF	MW-02GF	10/2/2019	**9.5**	SHALLOW
MW-3-1	MW-3-1	5/2/2019	**8.6**	DEEP 2
MW-3-1	MW-3-1	10/3/2019	**10**	DEEP 2
MW-3-1	REP100319TD1	10/3/2019	**10**	DEEP 2
N-10624	N-10624	5/1/2019	**3.1**	INTERMEDIATE
N-10627	N-10627	5/1/2019	**3.6**	DEEP
N-10631	N-10631	5/1/2019	**4.1**	SHALLOW
N-10631	N-10631	10/15/2019	**4**	SHALLOW

Footnotes on last page

Table 14
Summary of 1,4-Dioxane Concentrations in OU2 Groundwater
Northrop Grumman Systems Corporation,
Bethpage, New York.

ARCADIS Design & Consultancy for natural and built assets

Well ID	Sample ID	Sample Date	1,4-Dioxane (g/L)	Hydrogeologic Zones
PLT1 MW-04	PLT1 MW-04	5/8/2019	< 0.24	SHALLOW
PLT1 MW-04	PLT1 MW-04	10/11/2019	**0.092 J**	SHALLOW
PLT1 MW-05	PLT1 MW-05	5/9/2019	< 0.24	SHALLOW
PLT1 MW-05	PLT1 MW-05	10/11/2019	< 0.23	SHALLOW
PLT1 MW-05	REP101119CK1	10/11/2019	< 0.23	SHALLOW
PLT1 MW-06	PLT1 MW-06	5/8/2019	< 0.24	SHALLOW
PLT1 MW-06	PLT1 MW-06	10/11/2019	< 0.24	SHALLOW
WELL 1	WELL 1	2/13/2019	**8.1**	DEEP 2
WELL 1	WELL 1	6/13/2019	**5.9**	DEEP 2
WELL 1	WELL 1	8/6/2019	**5.1**	DEEP 2
WELL 1	WELL 1	12/23/2019	**9.7**	DEEP 2
WELL 17	WELL 17	2/13/2019	**7.3**	DEEP 2
WELL 17	WELL 17	6/13/2019	**6.8**	DEEP 2
WELL 17	WELL 17	8/6/2019	**6**	DEEP 2
WELL 17	WELL 17	12/27/2019	**9**	DEEP 2
Well 18	REP-061319-MG-1	6/13/2019	**5.8**	DEEP 2
WELL 18	WELL 18	2/13/2019	**5.7**	DEEP 2
WELL 18	WELL 18	6/13/2019	**4.9**	DEEP 2
WELL 18	WELL 18	8/6/2019	**4.6**	DEEP 2
WELL 18	WELL 18	12/27/2019	**5.8**	DEEP 2
Well 19	REP-122719-RA-1	12/27/2019	**3.7**	DEEP 2
WELL 19	WELL 19	2/13/2019	**4.6 J**	DEEP 2
WELL 19	REP-021319-RM-1	2/13/2019	**3.2 J**	DEEP 2
WELL 19	WELL 19	6/13/2019	**3.9**	DEEP 2
WELL 19	WELL 19	8/6/2019	**3.4**	DEEP 2
WELL 19	WELL 19	12/27/2019	**5.1**	DEEP 2
WELL 3R	WELL 3R	2/13/2019	**10**	DEEP 2
WELL 3R	WELL 3R	6/13/2019	**10**	DEEP 2
WELL 3R	WELL 3R	8/6/2019	**11**	DEEP 2
WELL 3R	WELL 3R	12/23/2019	**15**	DEEP 2

Notes and Abbreviations:

(1) The NAVY abandoned original Wells BPOW4-1 and BPOW4-2 and installed replacement Wells BPOW4-1R and BPOW4-2R between August, 2014 and October, 2014.

Results are validated at 20% frequency, per protocols specified in OU2 Groundwater Monitoring Plan (Arcadis 2016).

Samples were analyzed for 1,4-Dioxane using USEPA Method 8270D SIM except for outpost wells (BPOW designation in Well ID) which were analyzed using USEPA Method 522.

Bold value indicates constituent detected.

< 0.20	Compound not detected above its laboratory quantification limit.
µg/L	micrograms per liter
B	Contamination found in associated blank
J	Value is estimated concentration
OU2	Operable Unit 2
REP	Blind Duplicate Sample
SIM	Selective Ion Monitoring
USEPA	United States Environmental Protection Agency

Table 15
Comparison of OU2 Fourth Quarter 2019
Verical Hydraulic Gradients to Model-Predicted Gradients
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Well Pair	Well Screen Midpoint Elevation (ft msl)	Water-Level Elevation (ft msl)	Vertical Gradient [1] (ft/ft) x 10^{-3}	Model-Predicted, OU2 Steady-State Vertical Gradient [2] (ft/ft) x 10^{-3}	Change Compared to Model-Predicted, Steady-State Vertical Gradient
Shallow-Shallow Wells [3]					
GM-17SR	50.79	73.69			
GM-17I	5.83	73.12	12.68	2.67	10.01
GM-78S	39.94	65.94			
GM-78I	5.56	65.78	4.65	1.75	2.90
Shallow-Intermediate Wells [3]					
GM-19S	59.36	69.01			
GM-19I	-25.14	68.01	11.83	0.47	11.36
GM-21S	40.81	68.61			
GM-21I	-29.28	67.53	15.41	5.99	9.42
Shallow-Deep Wells [3]					
GM-17I	5.83	73.12			
GM-17D	-172.32	68.86	23.91	20.43	3.48
GM-18I	9.03	68.93			
GM-18D	-186.12	65.80	16.04	19.16	-3.12
GM-20I	3.88	68.16			
GM-20D	-117.08	66.64	12.57	26.70	-14.13
GM-21I	-29.28	67.53			
GM-21D	-177.34	64.11	23.10	42.55	-19.45
GM-74I	8.42	68.12			
GM-74D	-192.57	64.07	20.15	35.13	-14.98
Deep-Deep 2 Wells [3]					
GM-15D	-227.34	65.09			
GM-15D2	-436.20	62.78	11.06	-16.32	27.38
GM-18D	-186.12	65.80			
GM-33D2	-403.15	59.65	28.34	49.49	-21.15
GM-21D	-177.34	64.11			
GM-21D2	-416.60	57.79	26.41	21.27	5.14
GM-39D_A	-169.77	65.30			
GM-39D_B	-312.92	62.46	19.84	25.92	-6.08
GM-74D	-192.57	64.07			
GM-74D2	-444.64	56.75	29.04	37.81	-8.77

See Notes and Abbreviations on last page

Table 15
Comparison of OU2 Fourth Quarter 2019
Verical Hydraulic Gradients to Model-Predicted Gradients
Northrop Grumman Systems Corporation,
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Well Pair	Well Screen Midpoint Elevation (ft msl)	Water-Level Elevation (ft msl)	Vertical Gradient [1] (ft/ft) x 10^{-3}	Model-Predicted, OU2 Steady-State Vertical Gradient [2] (ft/ft) x 10^{-3}	Change Compared to Model-Predicted, Steady-State Vertical Gradient
Deep 2-Deep 2 Wells [3]					
GM-73D	-301.13	62.71			
GM-73D2	-437.38	60.44	16.66	23.85	-7.19
GM-74D2	-444.64	56.75			
GM-74D3	-527.42	58.98	-26.94	-37.49	10.55
GM-73D	-301.13	62.71			
GM-73D3	-537.86	59.71	12.67	10.12	2.55

Notes and Abbreviations:

(1) Vertical hydraulic gradients are calculated as follows:

$$\frac{(\text{Water-Level Elevation}_1 - \text{Water-Level Elevation}_2)}{(\text{Screen Midpoint Elevation}_1 - \text{Screen Midpoint Elevation}_2)}$$

$_1$ - Shallower well of pairing

$_2$ - Deeper well of pairing

A positive "+" gradient value indicates a downward hydraulic gradient.

A negative "-" gradient value indicates an upward hydraulic gradient.

(2) The 2003 expanded model with subsequent 2004/2005 modifications to the ONCT System was used to calculate the Steady State Vertical Gradient.

(3) Well identification (e.g., GM-73D) does not necessarily designate the actual hydrogeologic zone. Determination of the hydrogeologic zone is based on the well screen interval and the regional model layering.

ft msl feet relative to mean sea level

OU2 Operable Unit 2

ONCT On-Site Containment

Table 16
Percent Change of Total Volatile Organic Compounds
in OU2 Monitoring Wells
Northrop Grumman Systems Corporation
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Percent Change in Total Volatile Organic Compounds in OU2 Wells Over Time					
Well ID	Highest Historical TVOC Concentration		Most Recent TVOC Concentration		Percent Change From Highest Historical Concentration
	Date	µg/L	Date	µg/L	
Upgradient From OU2 ONCT System					
FW-03	1/3/2002	64.90	10/14/2019	7.30	-88.75%
GM-13D	**3/23/2000**	**2,401.00**	**5/13/2019**	**64.40**	**-97.32%**
HN-24I	**12/1/1991**	**58,034.00**	**5/2/2019**	**12.05**	**-99.98%**
HN-40S	3/17/2006	8.00	4/15/2019	0.00	-100.00%
HN-40I	12/22/2003	53.30	4/15/2019	2.04	-96.17%
HN-42S	3/18/2003	5.00	4/12/2019	0.00	-100.00%
HN-42I	7/8/2009	27.40	4/12/2019	0.00	-100.00%
Average:	--	8,656.23	--	12.26	**-99.86%**
Proximate to OU2 ONCT System					
GM-15SR	6/28/2017	11.10	10/23/2019	4.94	-55.50%
GM-15I	2/24/2010	38.20	10/23/2019	3.90	-89.79%
GM-15D	**10/8/2001**	**39.90**	**10/23/2019**	**0.35**	**-99.12%**
GM-15D2	**3/21/2003**	**36.50**	**10/23/2019**	**10.21**	**-72.03%**
GM-17I	3/28/2003	2.50	10/1/2019	0.00	-100.00%
GM-17D	12/27/2001	3.00	10/1/2019	0.00	-100.00%
GM-18I	10/29/1991	14.00	10/4/2019	0.00	-100.00%
GM-18D	4/11/2006	12.90	10/4/2019	0.65	-94.96%
GM-20I	6/5/2001	899.00	4/25/2019	0.68	-99.92%
GM-20D	6/28/2018	50.19	11/13/2019	0.00	-100.00%
GM-21S	10/22/1991	7.00	4/17/2019	0.00	-100.00%
GM-21I	10/23/1991	17.00	4/30/2019	0.00	-100.00%
GM-21D[(1)]	9/10/2019	8.00	9/10/2019	8.00	0.00%
GM-21D2	**2/11/2016**	**277.64**	**11/13/2019**	**6.80**	**-97.55%**
GM-33D2	**11/2/1994**	**16,000.00**	**10/15/2019**	**12.80**	**-99.92%**
GM-39DA	3/23/2004	42.00	10/9/2019	1.60	-96.19%
GM-39DB	1/7/2003	111.00	10/9/2019	43.30	-60.99%
GM-73D	10/18/2002	780.00	10/8/2019	7.30	-99.06%
GM-73D2	**11/22/2002**	**1,204.00**	**10/8/2019**	**31.20**	**-97.41%**
GM-73D3[(1)]	10/8/2019	3.30	10/8/2019	3.30	0.00%
GM-74I	**12/9/2013**	**1.37**	**11/18/2019**	**0.76**	**-44.53%**
GM-74D	**2/5/2001**	**87.00**	**10/7/2019**	**1.10**	**-98.74%**
GM-74D2	**3/20/2006**	**25.40**	**10/7/2019**	**9.85**	**-61.22%**
GM-74D3	**6/13/2015**	**11.49**	**10/7/2019**	**10.60**	**-7.75%**
GM-78S	6/18/2002	8.80	4/23/2019	0.00	-100.00%
GM-78I	1/9/2002	7.00	4/22/2019	0.69	-90.14%
GM-78D	4/26/2013	4.78	10/10/2019	1.10	-76.99%
GM-78D2	5/4/2017	1.60	10/10/2019	0.81	-49.38%
MW-3-1	3/28/2012	1,620.40	10/3/2019	308.50	-80.96%
N-10631	5/13/1997	11.70	10/15/2019	0.68	-94.19%
Average:	--	711.23	--	15.64	**-97.80%**

Footnotes on last page

Table 16
Percent Change of Total Volatile Organic Compounds
in OU2 Monitoring Wells
Northrop Grumman Systems Corporation
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Well ID	Highest Historical TVOC Concentration		Most Recent TVOC Concentration		Percent Change From Highest Historical Concentration
	Date	µg/L	Date	µg/L	
Downgradient of OU2 ONCT System					
GM-34D	11/30/2006	1,172.02	10/3/2019	170.96	-85.41%
GM-34D2	6/9/2005	415.00	10/24/2019	83.31	-79.93%
GM-35D2	**10/3/2002**	**454.60**	**10/9/2019**	**24.70**	**-94.57%**
GM-36D	8/23/1993	255.00	5/21/2019	0.00	-100.00%
GM-36D2[(1)]	**6/26/2018**	**5.29**	**6/26/2018**	**5.29**	**0.00%**
GM-37D	**9/7/1999**	**41.00**	**5/3/2019**	**10.70**	**-73.90%**
GM-37D2	7/13/2000	29.00	5/3/2019	5.58	-80.76%
GM-38D	**12/11/1996**	**1,622.30**	**10/2/2019**	**108.48**	**-93.31%**
GM-38D2	**7/1/2002**	**2,012.00**	**10/2/2019**	**20.27**	**-98.99%**
GM-70D2	**12/16/1996**	**313.60**	**5/3/2019**	**9.20**	**-97.07%**
GM-71D2	4/12/2016	26.50	5/6/2019	18.90	-28.68%
GM-75D2	**10/3/2002**	**1,566.40**	**11/13/2019**	**17.00**	**-98.91%**
GM-79I	2/14/2012	31.36	10/10/2019	0.00	-100.00%
GM-79D	4/7/2003	115.80	10/10/2019	15.80	-86.36%
N-10624	3/31/2004	3.00	5/1/2019	0.83	-72.33%
N-10627	12/1/1999	26.60	5/1/2019	0.00	-100.00%
BPOW 1-1	**4/30/2004**	**30.20**	**10/16/2019**	**1.00**	**-96.69%**
BPOW 1-2	**6/7/2016**	**1.65**	**10/16/2019**	**0.38**	**-76.91%**
BPOW 1-3	6/18/2007	16.00	10/16/2019	0.00	-100.00%
BPOW 1-4	11/8/2017	0.20	10/18/2019	0.00	-100.00%
BPOW 1-6	11/29/2016	0.07	10/21/2019	0.00	-100.00%
BPOW 2-1	6/19/2007	229.72	10/21/2019	0.00	-100.00%
BPOW 2-2	1/17/2006	2.62	10/21/2019	0.00	-100.00%
BPOW 2-3	12/22/2011	0.56	10/21/2019	0.00	-100.00%
BPOW 3-1	6/4/2019	0.20	10/22/2019	0.00	-100.00%
BPOW 3-2	10/21/2003	0.29	10/22/2019	0.00	-100.00%
BPOW 3-3	**2/20/2013**	**0.36**	**10/22/2019**	**0.00**	**-100.00%**
BPOW 3-4	**4/16/2018**	**235.27**	**10/22/2019**	**170.48**	**-27.54%**
BPOW 4-1R[(2)]	**10/25/2019**	**33.44**	**10/25/2019**	**33.44**	**0.00%**
BPOW 4-2R[(2)]	**10/24/2019**	**22.17**	**10/24/2019**	**22.17**	**0.00%**
Average:	**--**	**288.74**	**--**	**23.95**	**-91.71%**
ONCT Remedial Wells					
Well 1	**3/17/1989**	**14,362.00**	**10/3/2019**	**308.50**	**-97.85%**
Well 17	**3/5/1998**	**7,200.00**	**12/27/2019**	**135.44**	**-98.12%**
Well 18	**10/16/2000**	**221.00**	**12/27/2019**	**58.68**	**-73.45%**
Well 19	**2/27/2012**	**237.26**	**12/27/2019**	**102.12**	**-56.96%**
Well 3R	**12/13/2017**	**646.80**	**12/23/2019**	**213.37**	**-67.01%**
Average:	**--**	**4,533.41**	**--**	**163.62**	**-96.39%**

Footnotes on last page

Table 16
Percent Change of Total Volatile Organic Compounds
in OU2 Monitoring Wells
Northrop Grumman Systems Corporation
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Footnotes:

Indicates % Decrease

Bold wells are shown in trend graph figures

Wells in table are organized based on proximity to OU2 ONCT System.

Well BPOW1-5 has no historical VOC detections and is not shown on table.

(1) Highest recorded TVOC concetration is also the most recent concentration, and based on table format, the wells show no percent change. However, since the start of record TVOC concentrations in these wells have increased but are currently 8 ug/L or less.

(2) Highest recorded TVOC concentration is also the most recent concentration, and based on table format the wells show no percent change. However, since start of record TVOC concentrations have increased. See associated trend graph for further detail on increasing TVOC concentrations.

FIGURES

CITY:(Reqd) DIV/GROUP:(Reqd) DB:(Reqd) LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
C:\Users\alsanchez\BIM 360\Arcadis\ANA - Northrop Grumman\Project Files\OU2 ONCT OM&M Program\2020\30038454\01-DWG\NGC-BP-ONCT-GW-REMEDY.dwg LAYOUT: 1 SAVED: 3/25/2020 12:22 PM ACADVER: 23.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 3/25/2020 2:12 PM BY: SANCHEZ, ADRIAN
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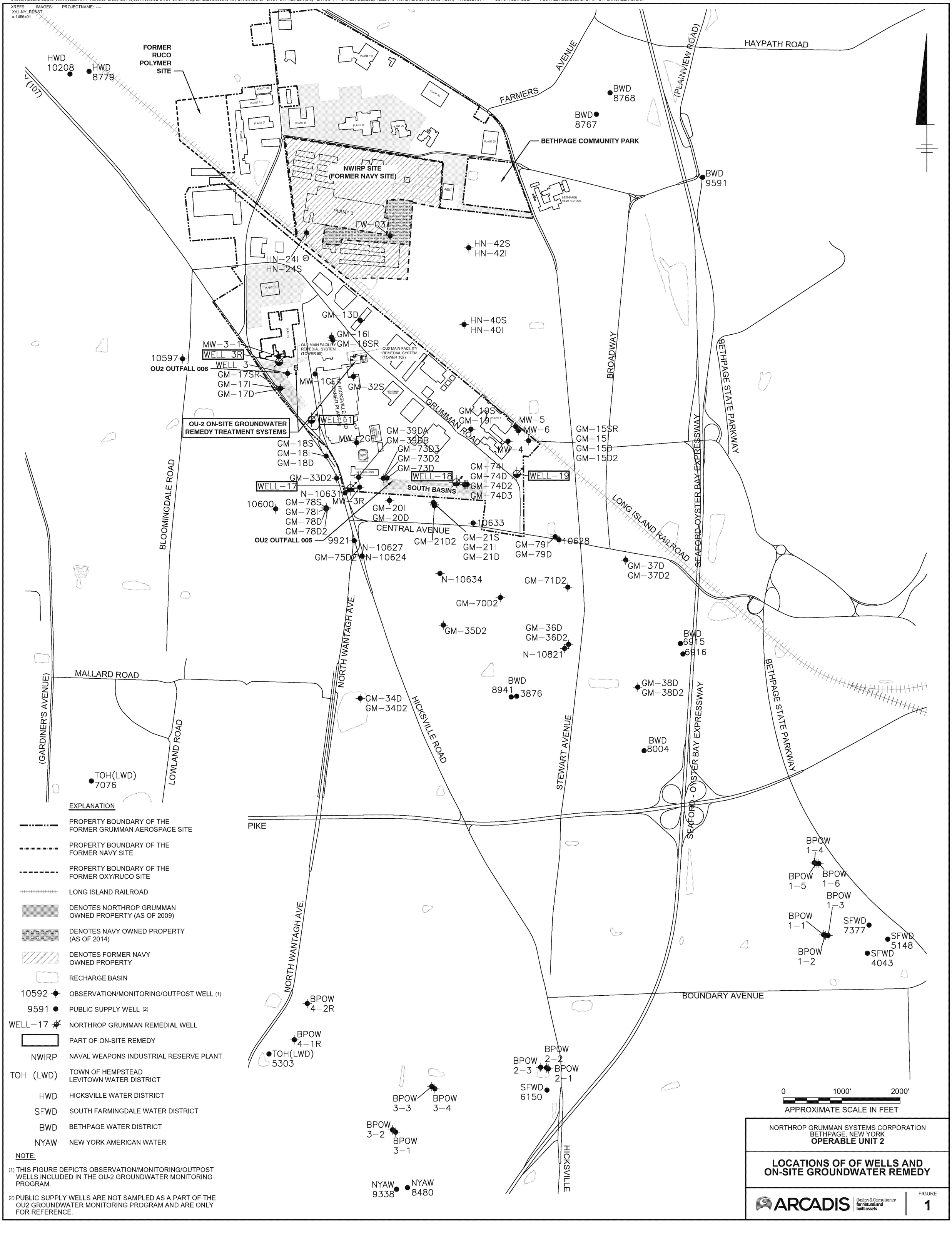
XrLI-NY_RD&ST
x-1496x01



EXPLANATION

- PROPERTY BOUNDARY OF THE FORMER GRUMMAN AEROSPACE SITE
- PROPERTY BOUNDARY OF THE FORMER NAVY SITE
- PROPERTY BOUNDARY OF THE FORMER OXY/RUCO SITE
- LONG ISLAND RAILROAD
- DENOTES NORTHROP GRUMMAN OWNED PROPERTY (AS OF 2009)
- DENOTES NAVY OWNED PROPERTY (AS OF 2014)
- DENOTES FORMER NAVY OWNED PROPERTY
- RECHARGE BASIN
- 10592 OBSERVATION/MONITORING/OUTPOST WELL (1)
- 9591 PUBLIC SUPPLY WELL (2)
- WELL-17 NORTHROP GRUMMAN REMEDIAL WELL
- PART OF ON-SITE REMEDY
- NWIRP NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
- TOH (LWD) TOWN OF HEMPSTEAD LEVITOWN WATER DISTRICT
- HWD HICKSVILLE WATER DISTRICT
- SFWD SOUTH FARMINGDALE WATER DISTRICT
- BWD BETHPAGE WATER DISTRICT
- NYAW NEW YORK AMERICAN WATER

NOTE:

(1) THIS FIGURE DEPICTS OBSERVATION/MONITORING/OUTPOST WELLS INCLUDED IN THE OU-2 GROUNDWATER MONITORING PROGRAM.

(2) PUBLIC SUPPLY WELLS ARE NOT SAMPLED AS A PART OF THE OU2 GROUNDWATER MONITORING PROGRAM AND ARE ONLY FOR REFERENCE.

NORTHROP GRUMMAN SYSTEMS CORPORATION
BETHPAGE, NEW YORK
OPERABLE UNIT 2

LOCATIONS OF OF WELLS AND ON-SITE GROUNDWATER REMEDY

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FIGURE 1

PLANT 25

PLANT 5

TOWER 102
TREATMENT
SYSTEM

WELL 3R

WEST RECHARGE BASINS
(OUTFALL 006)

WELL 3

TOWER 96
TREATMENT
SYSTEM

PLANT 2

LONG ISLAND RAILROAD

GRUMMAN ROAD WEST

PLANT 1

GRUMMAN ROAD EAST

WELL
1

AERATION BASIN

LIRR

WELL
17

WELL 18

SOUTH RECHARGE BASINS
(OUTFALL 005)

WELL
19

SUN-SITE

LEGEND:

- FORMER NORTHROP GRUMMAN PROPERTY LINE
- INFLUENT LINE
- BYPASS
- STORM DRAIN (EFFLUENT)
- NON POTABLE WATER DISTRIBUTION LINE (EFFLUENT)
- RAILROAD TRACKS
- FENCE
- WELL 18 — REMEDIAL WELL
- BASIN
- ONCT — ON-SITE CONTAMINANT

NOTES:

DRAWING IS NOT TO BE USED FOR DESIGN PURPOSES. LAYOUT OF PIPING IS FOR REPRESENTATION ONLY (LOCATIONS ARE APPROXIMATE).

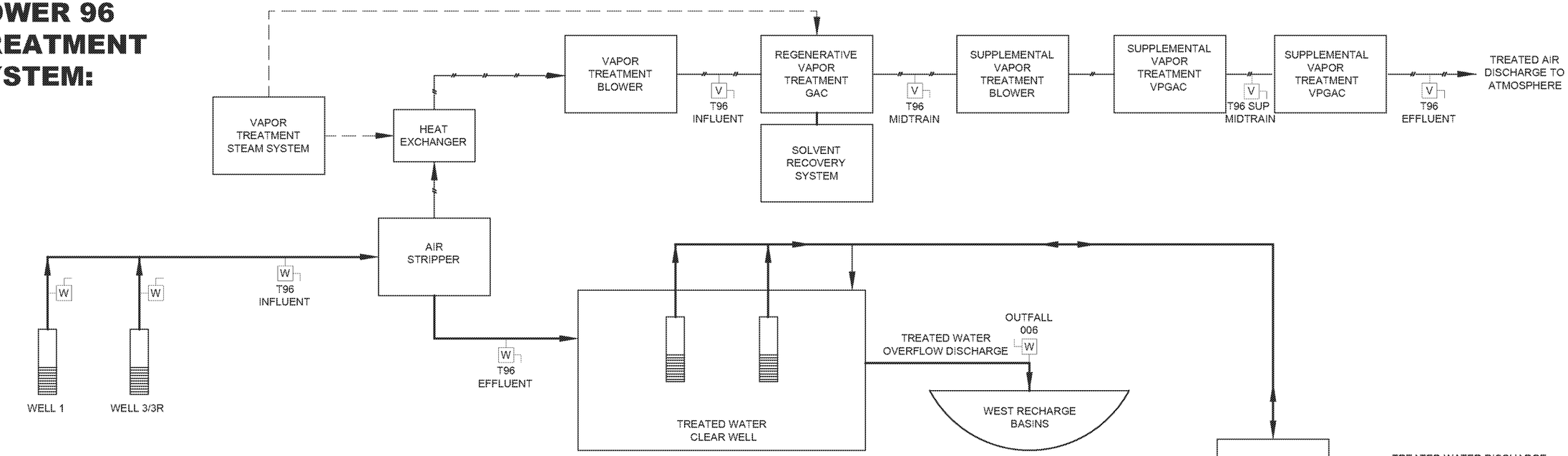
NORTHROP GRUMMAN SYSTEMS CORPORATION
BETHPAGE, NEW YORK
OPERABLE UNIT 2

ONCT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM SITE PLAN

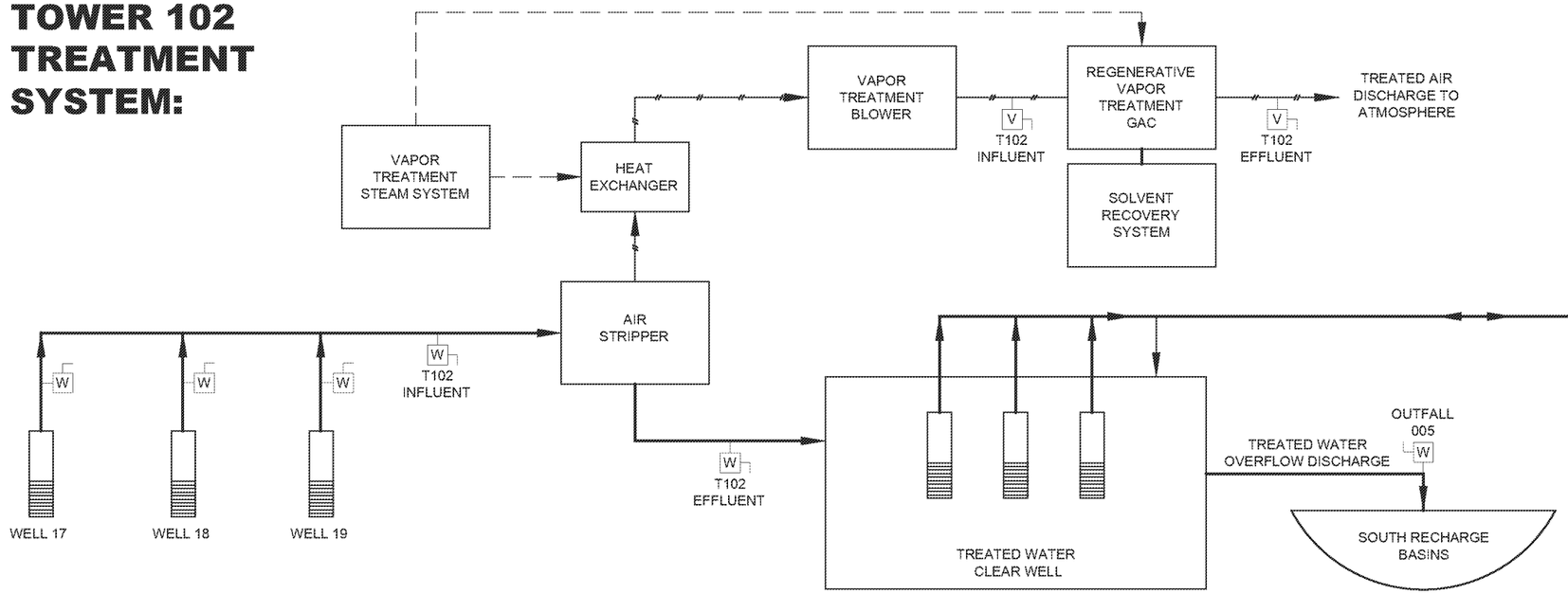
ARCADIS Design & Consultancy for natural and built assets

FIGURE
2

TOWER 96 TREATMENT SYSTEM:



TOWER 102 TREATMENT SYSTEM:



LEGEND:

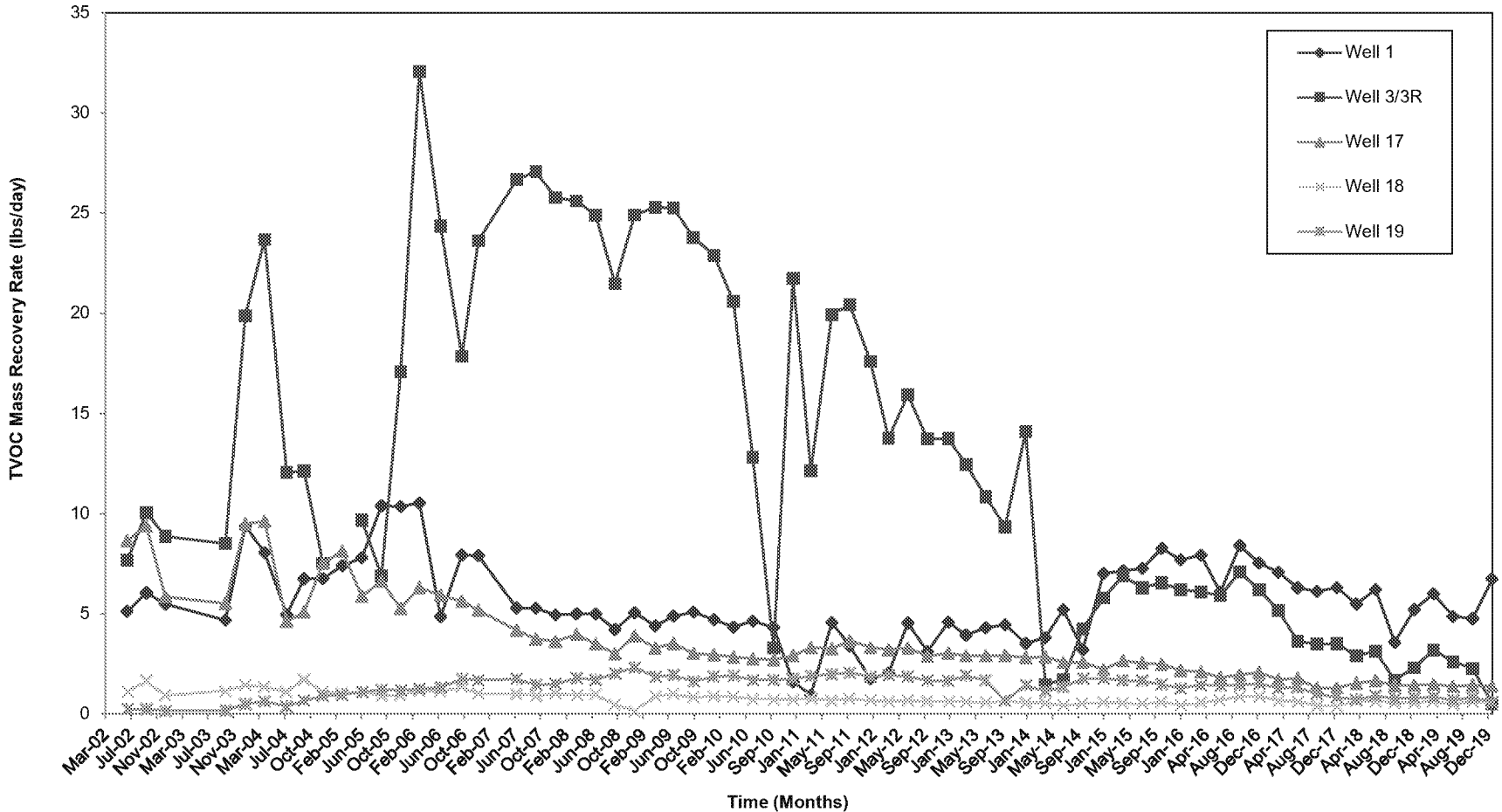
- PROCESS WATER
- PROCESS AIR
- STEAM
- SAMPLE LOCATION
- W — WATER SAMPLE
- V — VAPOR SAMPLE
- ONCT — ON-SITE CONTAMINANT

NORTHROP GRUMMAN SYSTEMS CORPORATION
BETHPAGE, NEW YORK
OPERABLE UNIT 2

ONCT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM SCHEMATIC

ARCADIS Design & Consultancy for natural and built assets

FIGURE 3



Abbreviations:

VOC = Volatile Organic Compound.

lbs/day = Pounds per day.

TVOCs = Sum of VOCs detected

NORTHROP GRUMMAN SYSTEMS CORPORATION

BETHPAGE, NEW YORK

OU2 ON-SITE GROUNDWATER REMEDY

REMEDIAL WELLS TOTAL VOC MASS RECOVERY RATES THROUGH DECEMBER 2019

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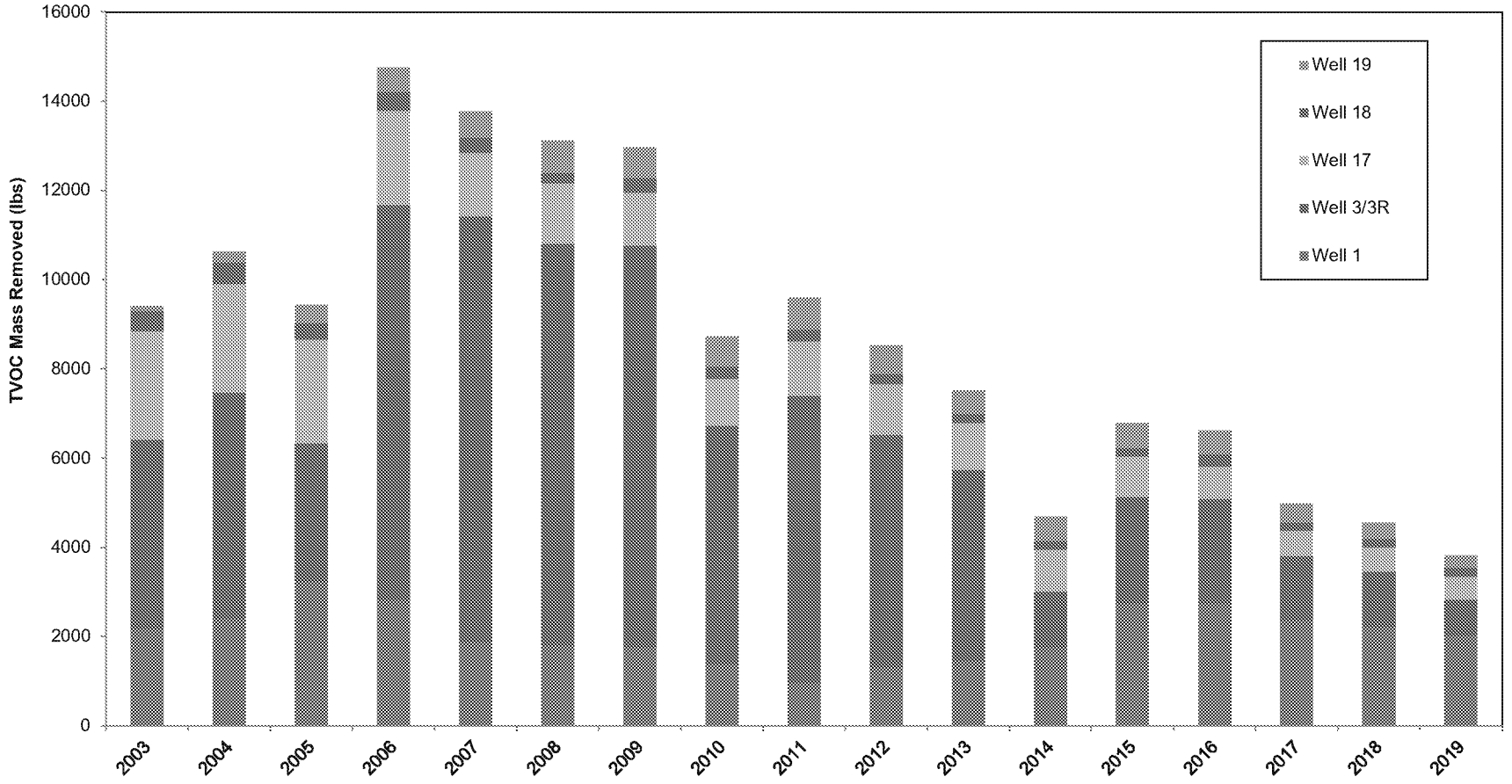
FIGURE 4

G:\APROJECT\Northrop Grumman Bethpage\OU2.2 ONCT\11 Draft Reports\2019 Annual\Figures\Draft Figure 4-6_VOC Mass RemovalFig 4. VOC MassRemRates

3/25/2020



Abbreviations:

VOC = Volatile Organic Compound

lbs = Pounds

TVOCs = Sum of VOCs detected

NORTHROP GRUMMAN SYSTEMS CORPORATION

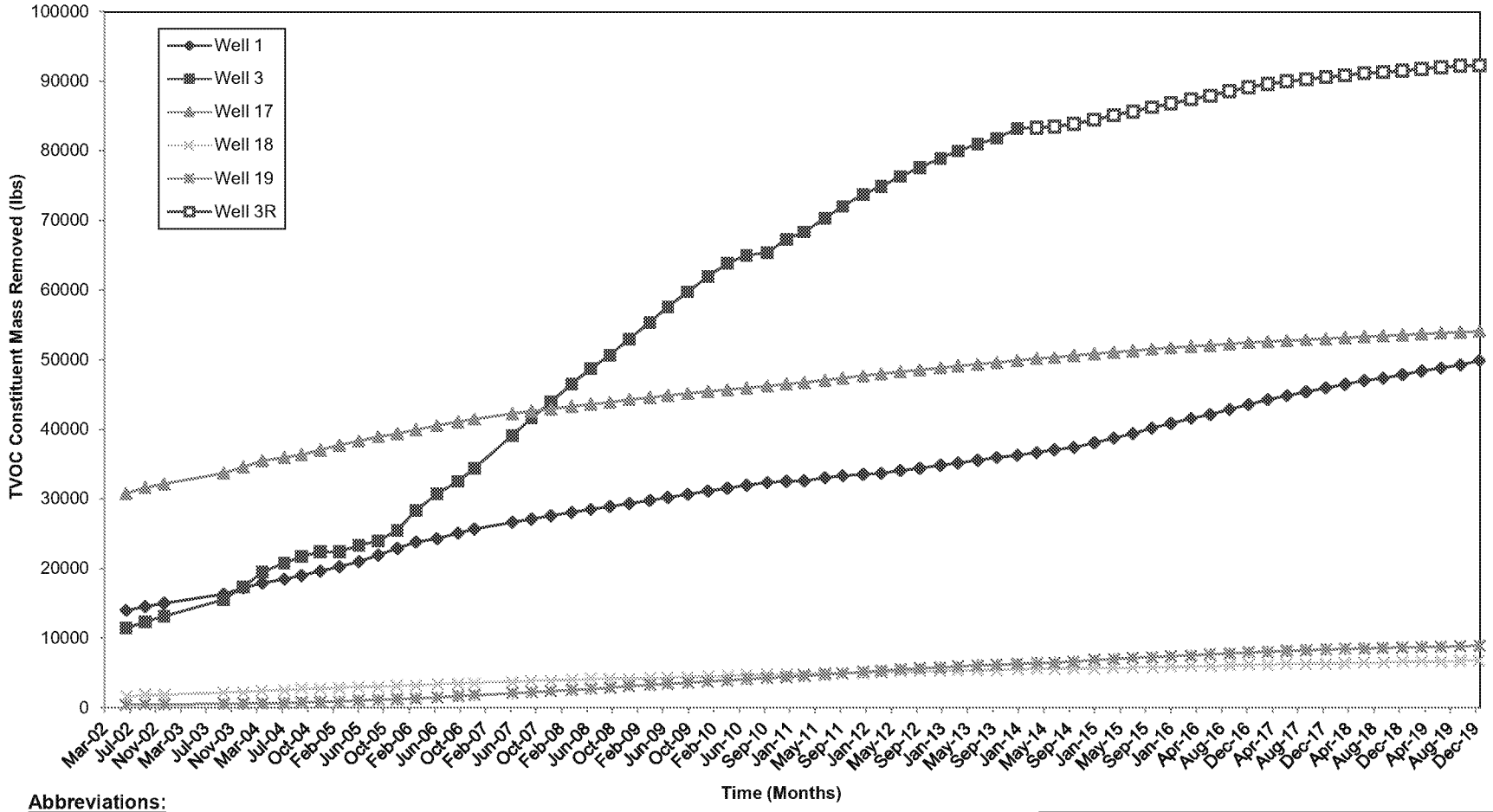
BETHPAGE, NEW YORK

OU2 ON-SITE GROUNDWATER REMEDY

REMEDIAL WELLS YEARLY TOTAL VOC MASS REMOVED THROUGH DECEMBER 2019

ARCADIS Design & Consultancy for natural and built assets

FIGURE 5



Abbreviations:

VOC = Volatile Organic Compound

lbs = Pounds

TVOCs = Sum of VOCs detected

ONCT = On-Site Containment

Notes:

1. Cumulative Total VOC Mass Removed includes mass removed since startup of the ONCT system in September 1998.

2. First, second and third quarters 2003, and first and second quarters 2007 were reported jointly.

NORTHROP GRUMMAN SYSTEMS CORPORATION

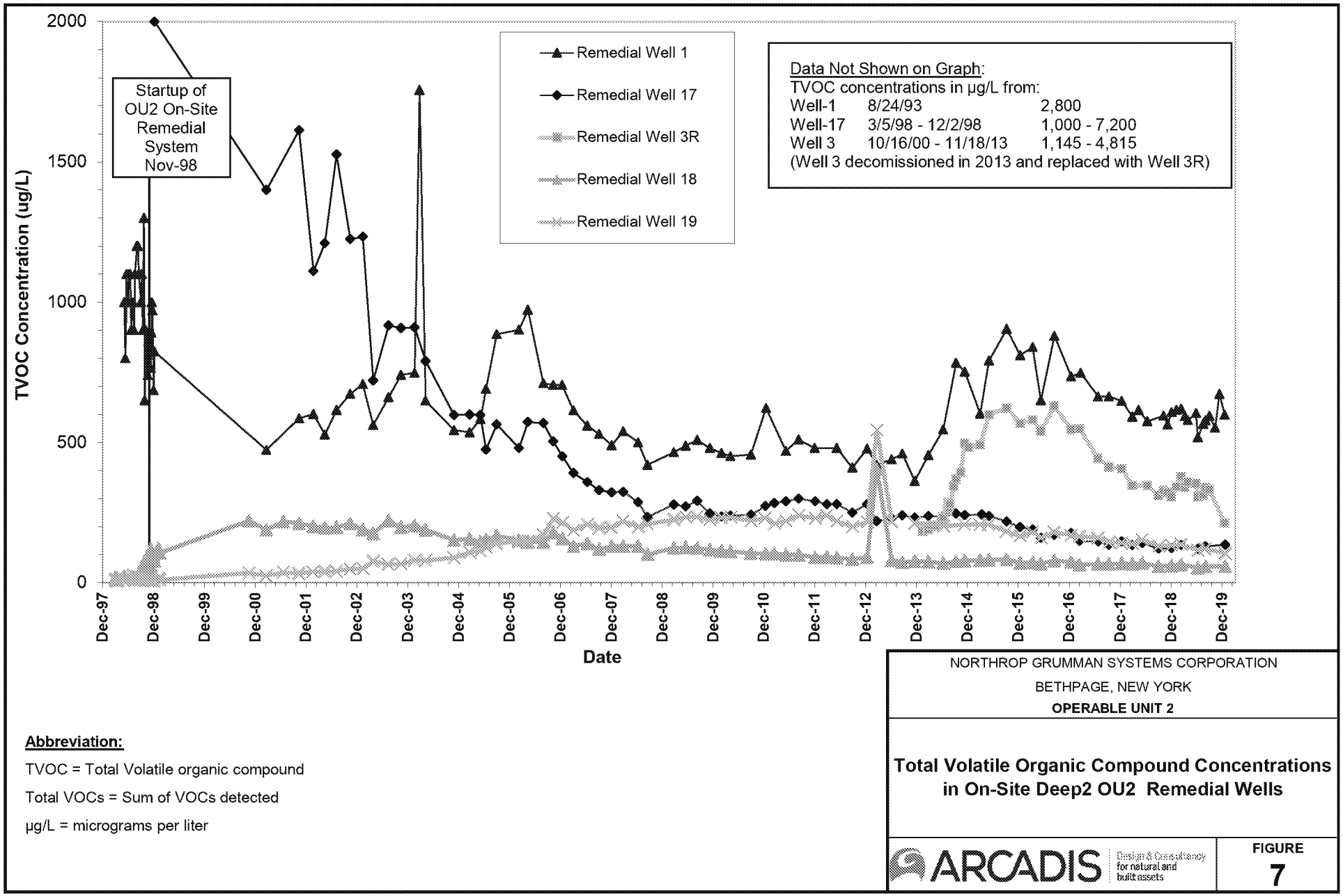
BETHPAGE, NEW YORK

OU2 ON-SITE GROUNDWATER REMEDY

REMEDIAL WELLS CUMULATIVE TOTAL VOC MASS REMOVED THROUGH DECEMBER 2019

ARCADIS Design & Consultancy for natural and built assets

FIGURE 6



Abbreviation:

TVOC = Total Volatile organic compound

Total VOCs = Sum of VOCs detected

µg/L = micrograms per liter

NORTHROP GRUMMAN SYSTEMS CORPORATION

BETHPAGE, NEW YORK

OPERABLE UNIT 2

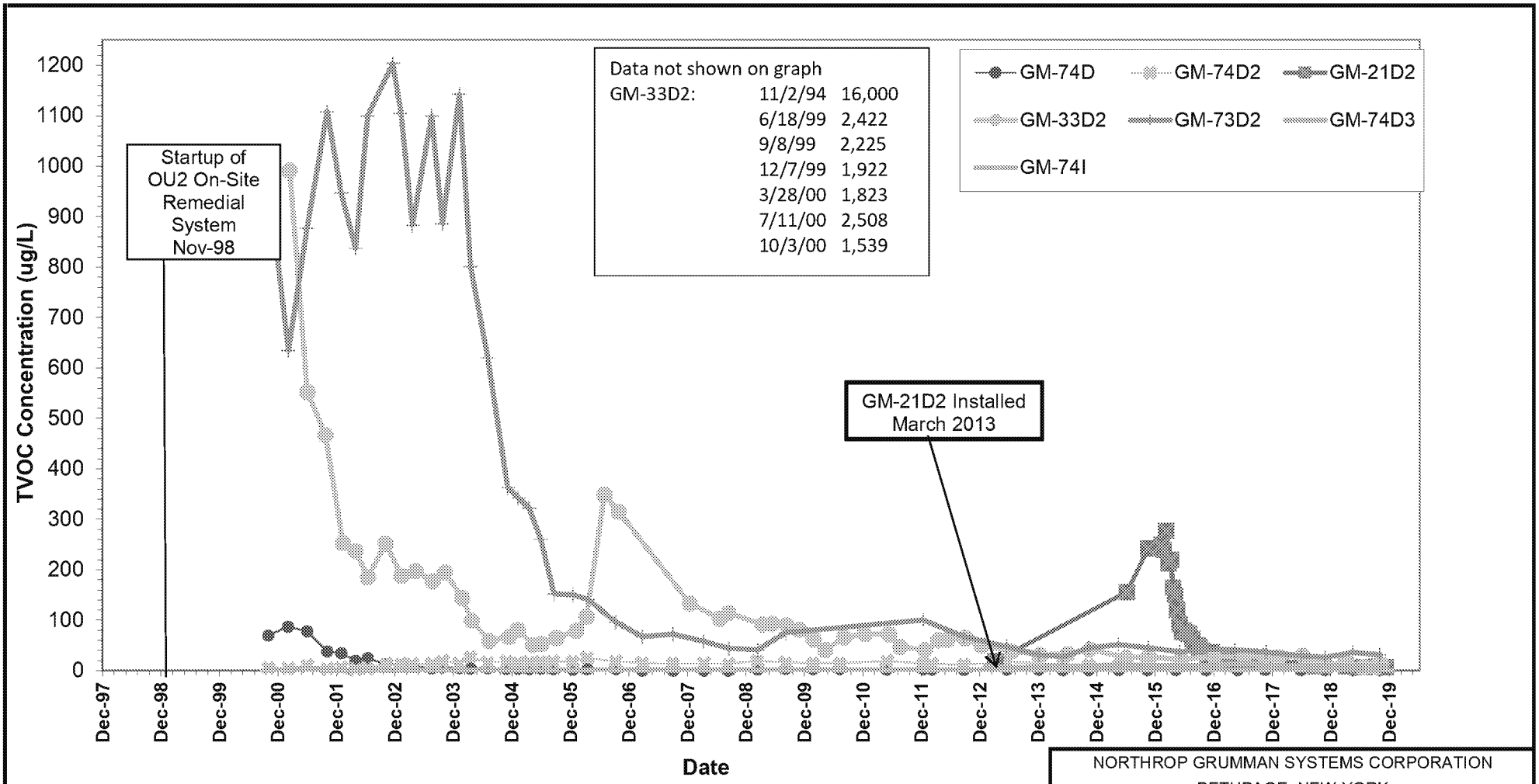
Total Volatile Organic Compound Concentrations in On-Site Deep2 OU2 Remedial Wells

ARCADIS Design & Consultancy for natural and built assets

FIGURE 7

G:\APROJECT\Northrop Grumman Bethpage\OU2.2 ONCT\10 Final Reports\2019 Annual\Figures\Hydro Figures\Revised_Figure 7,8,18-20,23-25_TrendGraphs_020620DCFigure 7 - remedial wells

3/31/2020



Abbreviation:

TVOC = Total Volatile organic compound

Total VOCs = Sum of VOCs detected

µg/L = micrograms per liter

GM-21D2 and GM-33D2 are a supplemental wells sampled on a quarterly basis

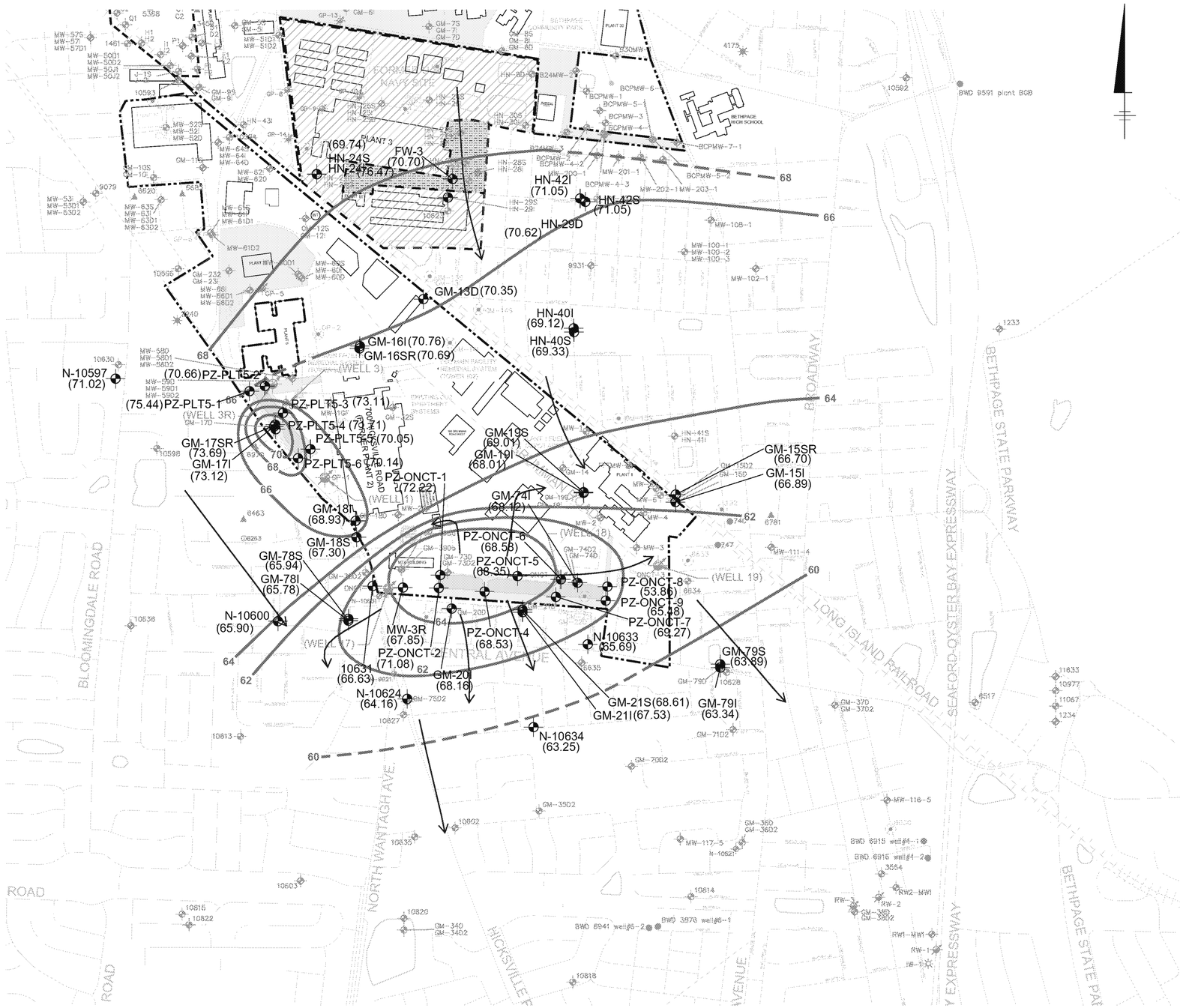
NORTHROP GRUMMAN SYSTEMS CORPORATION
BETHPAGE, NEW YORK
OPERABLE UNIT 2

Total Volatile Organic Compound Concentrations in Intermediate, Deep, and Deep2 Monitoring Wells Proximate to OU2 ONCT System

ARCADIS Design & Consultancy for natural and built assets

FIGURE 8

G:\APROJECT\Northrop Grumman Bethpage\OU2.2 ONCT\10 Final Reports\2019 Annual\Figures\Hydro Figures\Revised_Figure 7,8,18-20,23-25_TrendGraphs_020620DCFigure 8 - onsite D,D2 3/31/2020



0 600' 1200'
APPROXIMATE SCALE IN FEET

EXPLANATION:

- PROPERTY BOUNDARY OF THE FORMER GRUMMAN AEROSPACE SITE
- PROPERTY BOUNDARY OF THE FORMER U.S. NAVY SITE
- LONG ISLAND RAILROAD
- NORTHROP GRUMMAN PROPERTY AS OF 2009
- NAVY PROPERTY AS OF 2014
- RECHARGE BASIN
- OBSERVATION/MONITORING WELL
- INDUSTRIAL WELL
- PUBLIC SUPPLY WELL
- IRRIGATION WELL
- NORTHROP GRUMMAN ONCT WELL
- ABANDONED WELL
- 62 — LINE OF EQUAL WATER-LEVEL ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL (DASHED WHERE LESS CONTROL)
- (66.89) WATER-LEVEL ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL
- DIRECTION OF HORIZONTAL COMPONENT OF GROUNDWATER FLOW
- OU-2 OPERABLE UNIT 2
- OU-3 OPERABLE UNIT 3

NOTES:

1. NORTHROP GRUMMAN ONCT WELLS 1, 3R, 17, 18 AND 19 SCREENED IN DEEP 2 ZONE.
2. BETHPAGE WATER DISTRICT WELL 3876 SCREENED IN DEEP ZONE.
3. BETHPAGE WATER DISTRICT WELLS 6915 AND 6916 SCREENED IN DEEP 2 ZONE.
4. BETHPAGE WATER DISTRICT WELL 8941 SCREENED IN DEEP 3 ZONE.

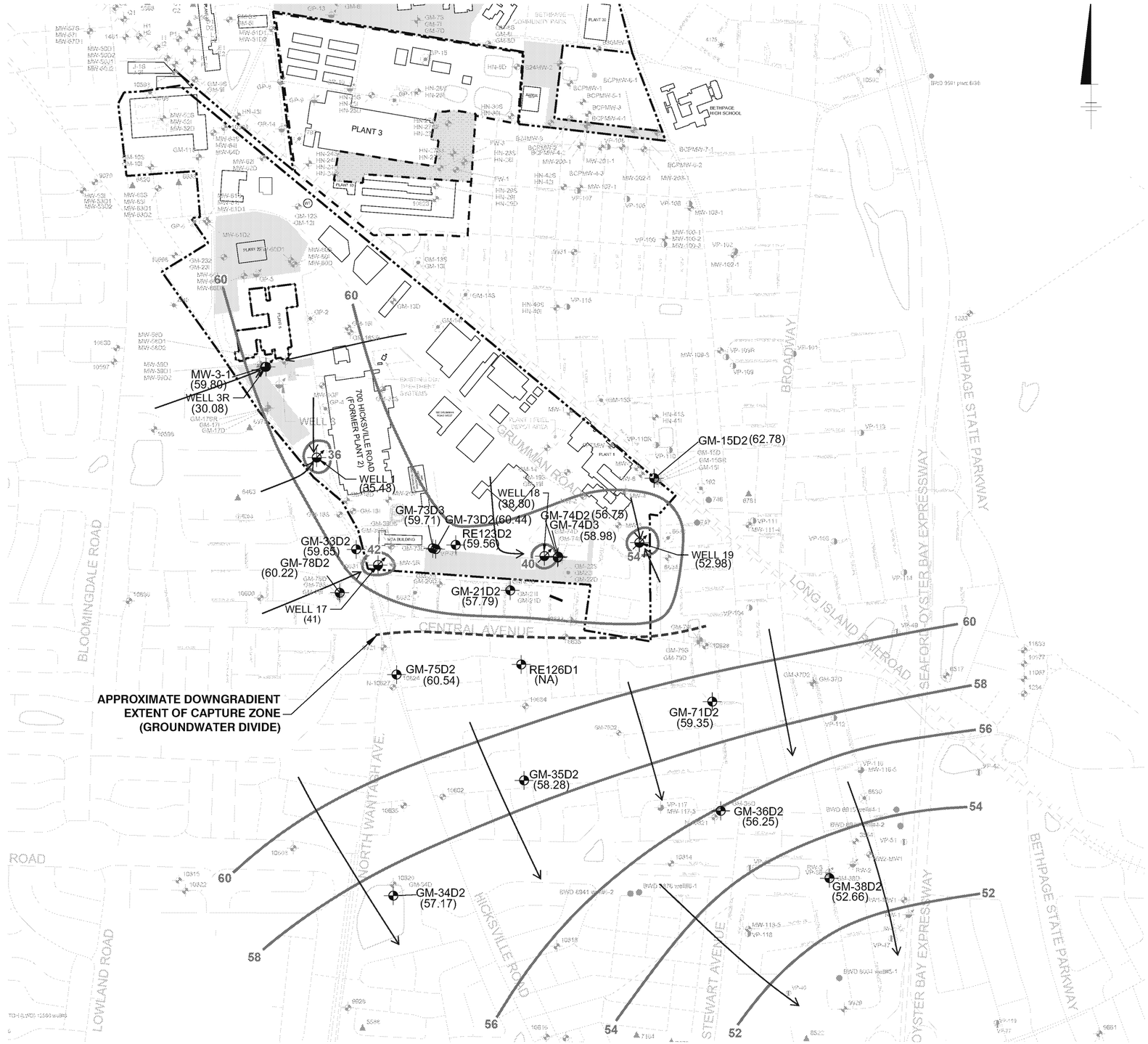
ALL COORDINATES REFERENCED TO NORTH AMERICAN DATUM 1983

NORTHROP GRUMMAN SYSTEMS CORPORATION
BETHPAGE, NEW YORK
OPERABLE UNIT 2

WATER-TABLE ELEVATION AND GENERALIZED HORIZONTAL GROUNDWATER FLOW DIRECTIONS IN THE SHALLOW/INTERMEDIATE ZONE, OCTOBER 2019

ARCADIS Design & Consultancy for natural and built assets

FIGURE
9



0 600' 1200'

APPROXIMATE SCALE IN FEET

EXPLANATION:

- PROPERTY BOUNDARY OF THE FORMER GRUMMAN AEROSPACE SITE
- PROPERTY BOUNDARY OF THE FORMER NAVY SITE
- LONG ISLAND RAILROAD
- NORTHROP GRUMMAN PROPERTY AS OF 2009
- NAVY PROPERTY AS OF 2014
- RECHARGE BASIN
- OBSERVATION/MONITORING WELL
- INDUSTRIAL WELL
- PUBLIC SUPPLY WELL
- IRRIGATION WELL
- NORTHROP GRUMMAN ONCT WELL
- ABANDONED WELL
- 58 — LINE OF EQUAL WATER-LEVEL ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL (DASHED WHERE LESS CONTROL)
- (52.48) — WATER-LEVEL ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL
- DIRECTION OF HORIZONTAL COMPONENT OF GROUNDWATER FLOW
- OU-2 — OPERABLE UNIT 2
- OU-3 — OPERABLE UNIT 3
- NA — NOT APPLICABLE, WATER LEVEL MEASUREMENT WAS COLLECTED OUTSIDE OF DECEMBER 2019 SYNOPTIC PERIOD

NOTES:

1. NORTHROP GRUMMAN ONCT WELLS 1, 3R, 17, 18 AND 19 SCREENED IN DEEP 2 ZONE.
2. BETHPAGE WATER DISTRICT WELL 3876 SCREENED IN DEEP ZONE (NOT PUMPING IN OCTOBER 2018).
3. BETHPAGE WATER DISTRICT WELLS 6915 AND 6916 SCREENED IN DEEP 2 ZONE.
4. BETHPAGE WATER DISTRICT WELL 8941 SCREENED IN DEEP 3 ZONE (NOT PUMPING IN OCTOBER 2018).

ALL COORDINATES REFERENCED TO NORTH AMERICAN DATUM 1983

NORTHROP GRUMMAN SYSTEMS CORPORATION
BETHPAGE, NEW YORK
OPERABLE UNIT 2

POTENTIOMETRIC SURFACE ELEVATION AND GENERALIZED HORIZONTAL GROUNDWATER FLOW DIRECTIONS IN THE DEEP 2 ZONE OCTOBER 2019

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FIGURE 10

CITY:SYRACUSE-NY DIV/GROUP:ENV DB:A.SANCHEZ LD:ALS PIC:(Opt) PM:(Req'd) TM:(Opt) LYR:(On)=*;OFF=*REF*
C:\Users\alsanchez\BIM 360\Arcadis\ANA - Northrop Grumman\Project Files\OU2 ONCT O&M\Program\2020\3009845401-DWG\NGSC-BP-ONCT-GW-02-ZONE.dwg LAYOUT: 10 SAVED: 3/25/2020 3:02 PM ACADVER: 23.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 3/25/2020 3:22 PM BY: SANCHEZ ADRIAN
XREFS: IMAGES: PROJECTNAME: ----
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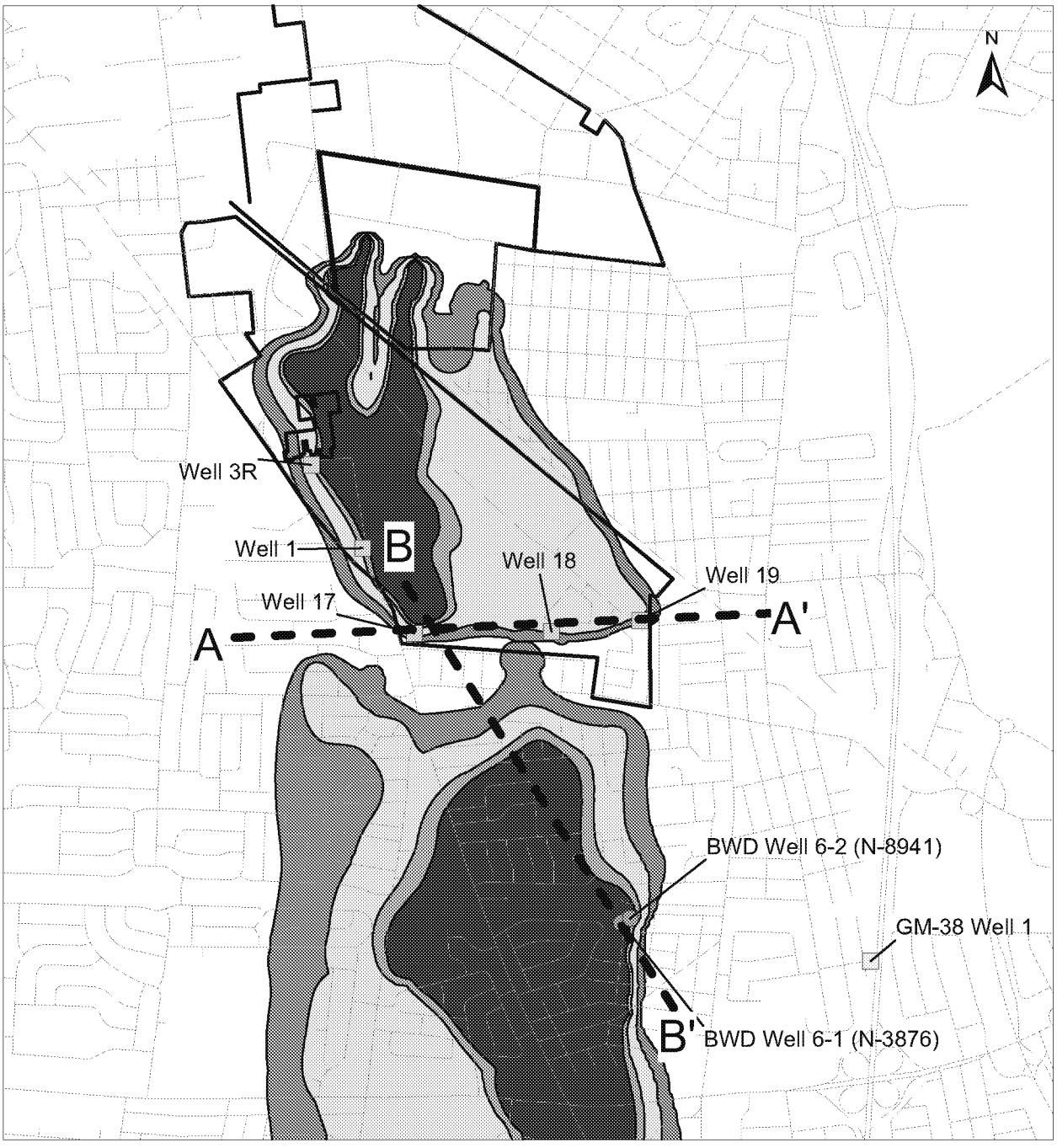
X-OU2-BDR-DL
X-LI-NY_RD&ST
X-1496Xsp
X-BDR-EL



1,000
500
50
5

Total Volatile Organic Compound (TVOC) Concentrations (µg/L)

Boundary of the Former Northrop Grumman / NWIRP Site

A-A' Cross-Section Line

Horizontal Scale (Feet)

0 2,000 4,000

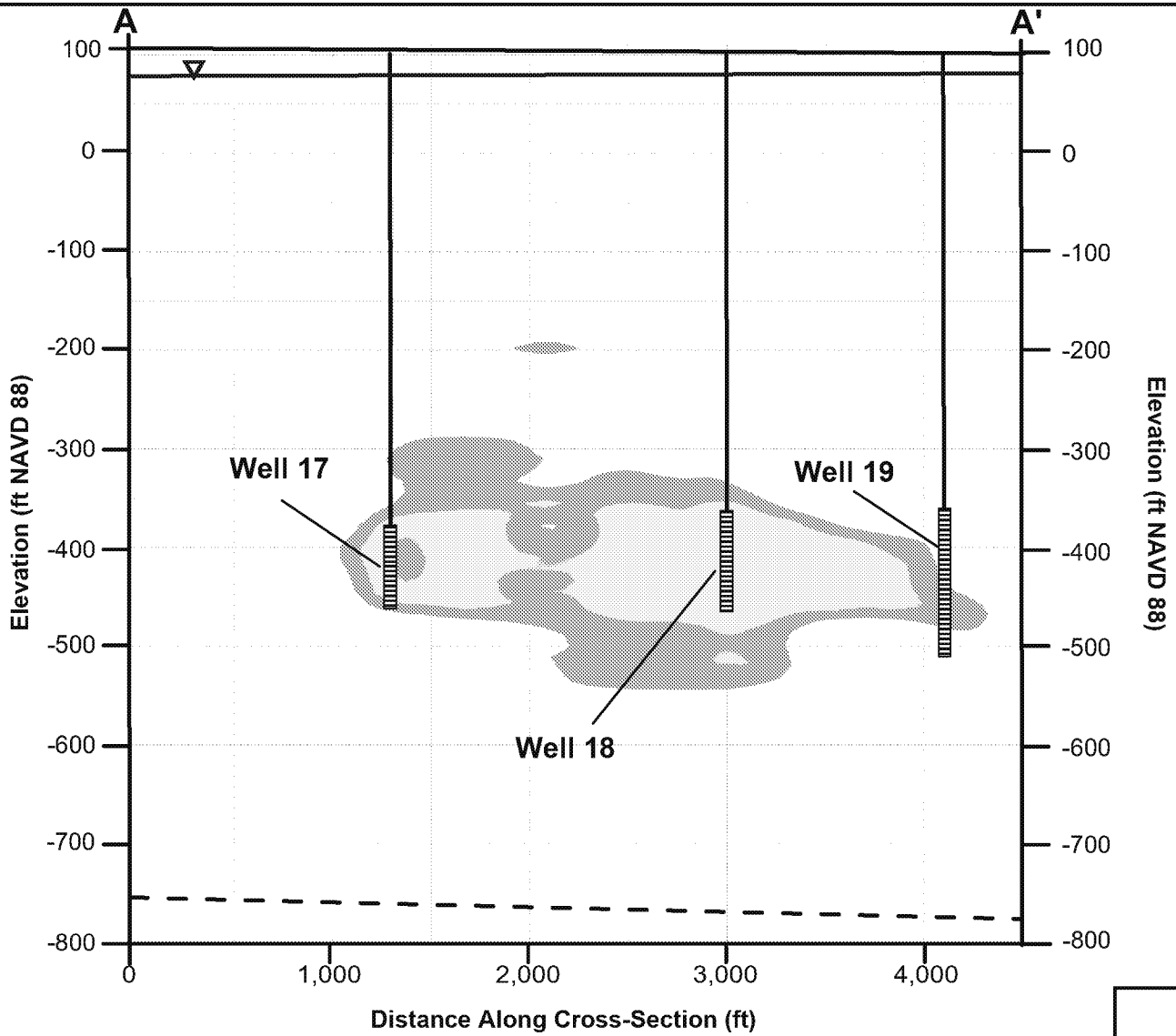
Plume is based on the most recently available data from each sampling location collected between 2007 and 2019. Data were collected from monitoring wells, vertical profile borings, remedial wells, and public supply wells.

Northrop Grumman Systems Corporation
Bethpage, New York

CROSS-SECTION LINES AND MAXIMUM TVOC CONCENTRATIONS 2019

ARCADIS Design & Consultancy for natural and built assets

FIGURE 11



NAVD 88 = North American Vertical Datum of 1988

TVOC = Total Volatile Organic Compound

Vertical Exaggeration is 5:1.

TVOCs Concentration (μg/L)

5 50 500 1,000

LEGEND

- Approximate Land Surface
- Approximate Water Table
- Approximate Top of Raritan Confining Unit

Extraction wells are projected onto the cross-section.

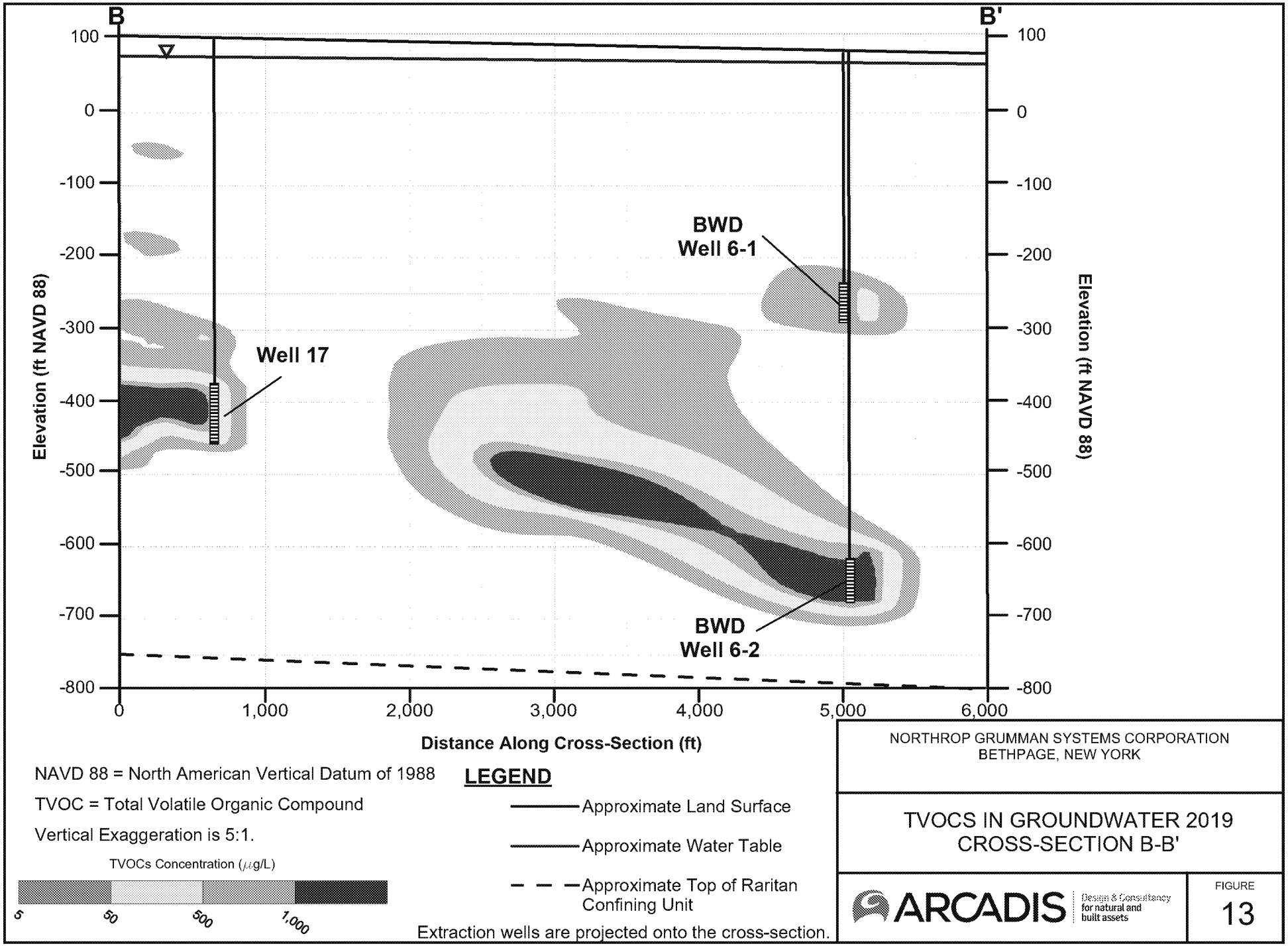
NORTHROP GRUMMAN SYSTEMS CORPORATION
BETHPAGE, NEW YORK

TVOCS IN GROUNDWATER 2019
CROSS-SECTION A-A'

ARCADIS Design & Consultancy for natural and built assets

FIGURE
12

ED_005646_00001051-00121



NAVD 88 = North American Vertical Datum of 1988

TVOC = Total Volatile Organic Compound

Vertical Exaggeration is 5:1.

TVOCs Concentration (μg/L)

5 50 500 1,000

LEGEND

- Approximate Land Surface
- Approximate Water Table
- Approximate Top of Raritan Confining Unit

Extraction wells are projected onto the cross-section.

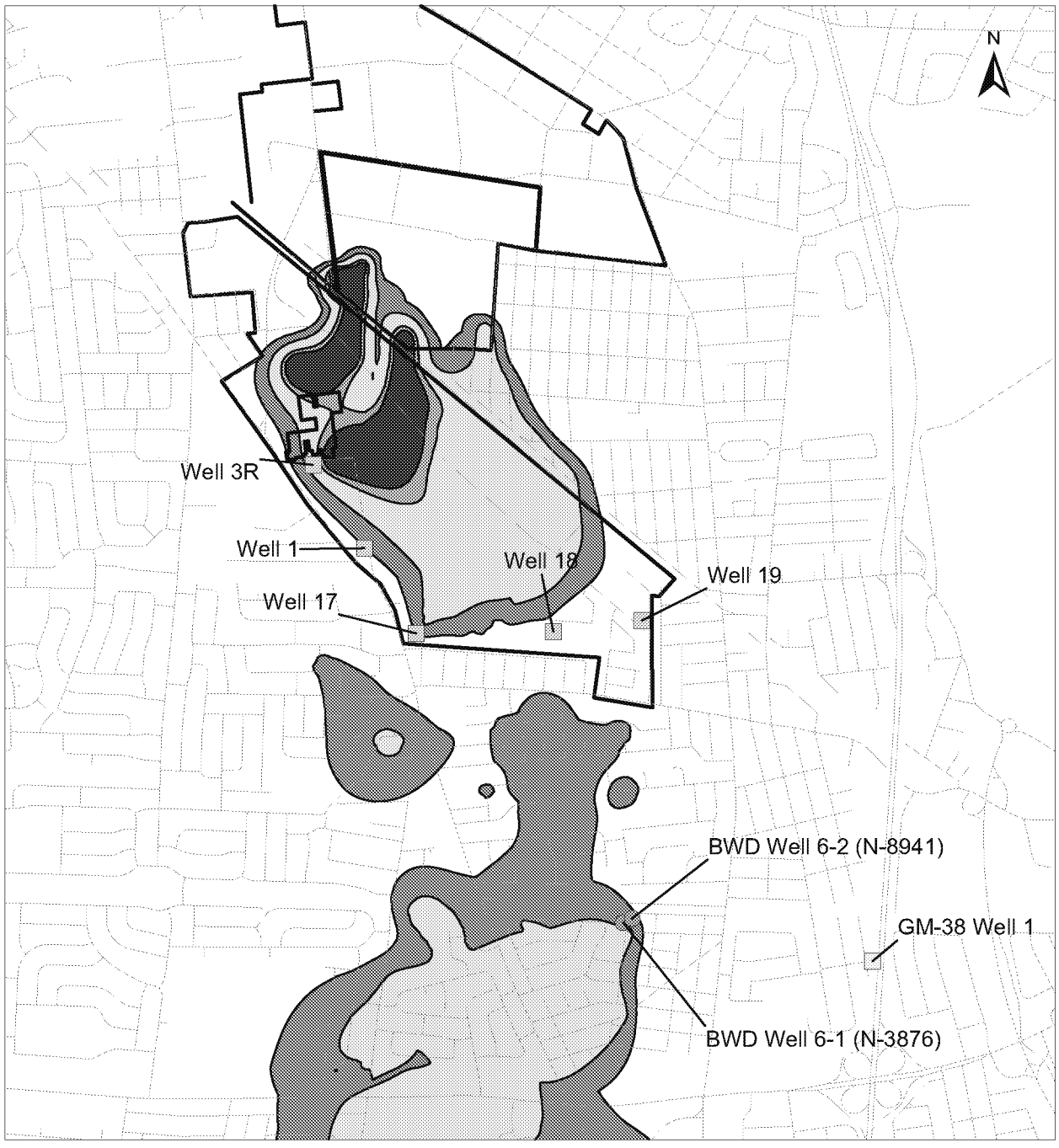
NORTHROP GRUMMAN SYSTEMS CORPORATION
BETHPAGE, NEW YORK

TVOCS IN GROUNDWATER 2019
CROSS-SECTION B-B'

ARCADIS Design & Consultancy for natural and built assets

FIGURE
13

ED_005646_00001051-00122



Total Volatile Organic Compound (TVOC) Concentrations (µg/L)

1,000

500

50

5

Boundary of the Former Northrop Grumman / NWIRP Site

Horizontal Scale (Feet)

0 2,000 4,000

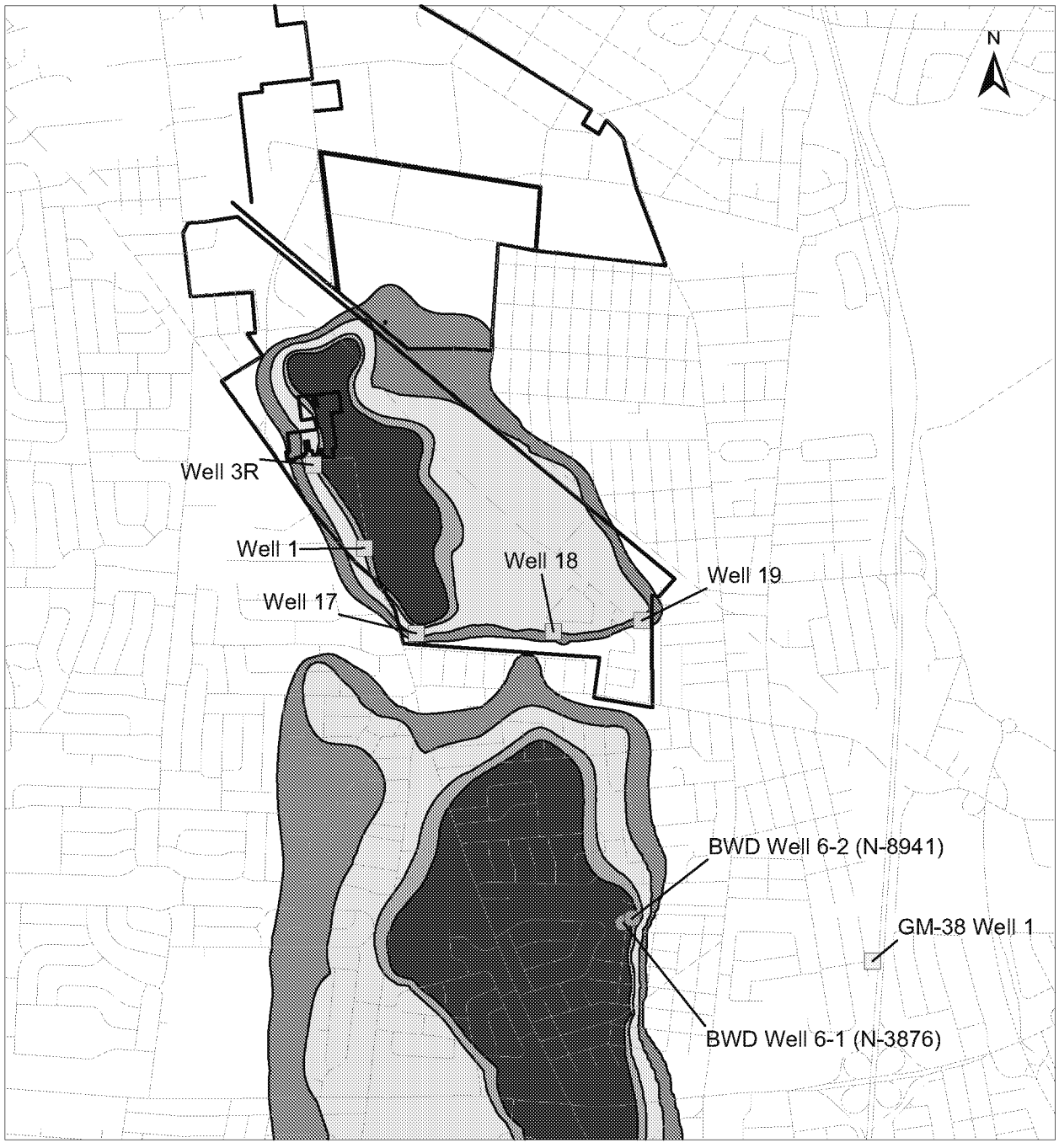
Plume is based on the most recently available data from each sampling location collected between 2007 and 2019. Data were collected from monitoring wells, vertical profile borings, remedial wells, and public supply wells.

Northrop Grumman Systems Corporation
Bethpage, New York

DEEP ZONE MAXIMUM TVOC CONCENTRATIONS 2019

ARCADIS Design & Consultancy for natural and built assets

FIGURE 14



Total Volatile Organic Compound (TVOC) Concentrations (µg/L)

1,000

500

50

5

Boundary of the Former Northrop Grumman / NWIRP Site

Horizontal Scale (Feet)

0 2,000 4,000

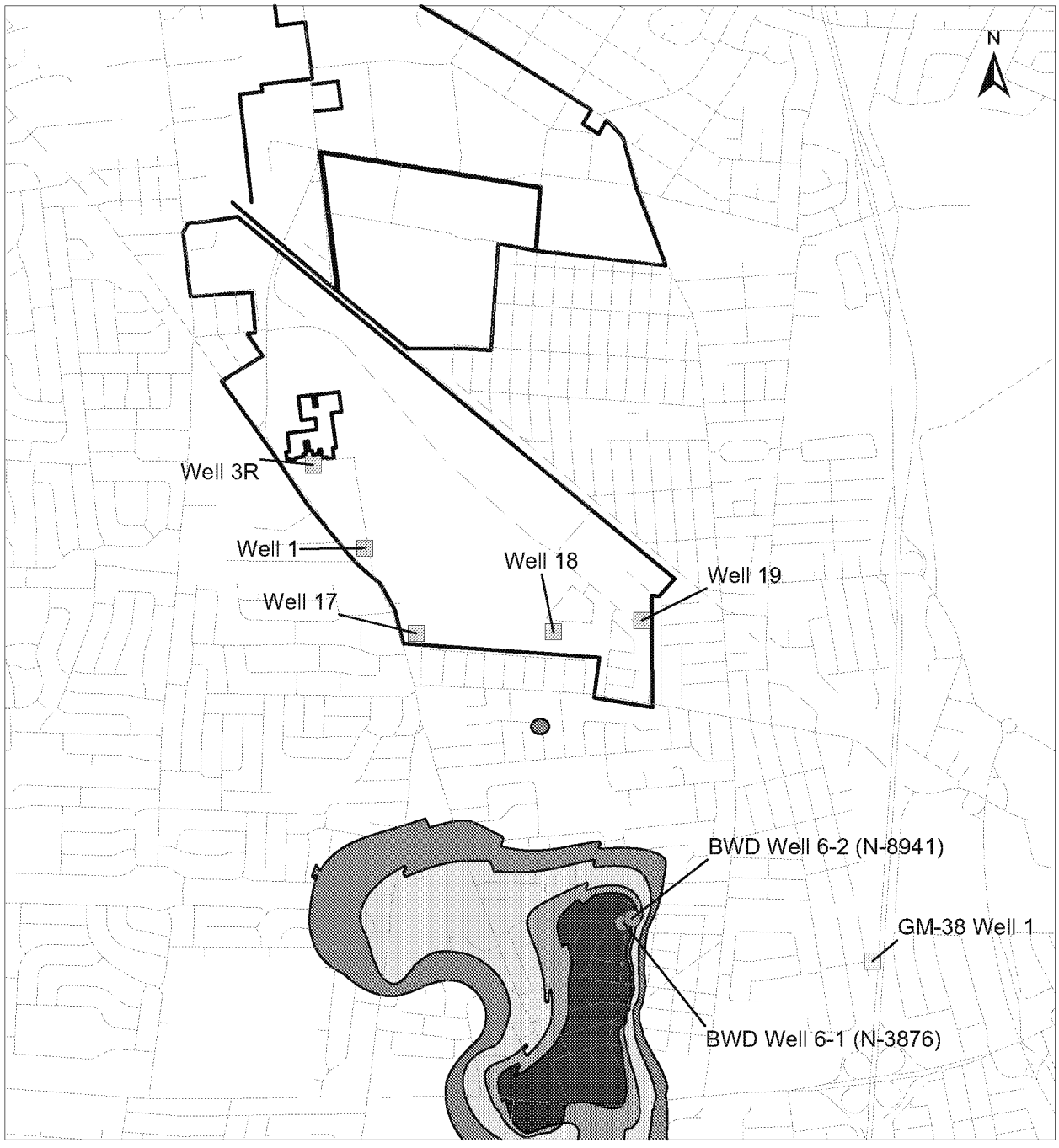
Plume is based on the most recently available data from each sampling location collected between 2007 and 2019. Data were collected from monitoring wells, vertical profile borings, remedial wells, and public supply wells.

Northrop Grumman Systems Corporation
Bethpage, New York

DEEP ZONE 2 MAXIMUM TVOC CONCENTRATIONS 2019

ARCADIS Design & Consultancy for natural and built assets

FIGURE 15



Total Volatile Organic Compound (TVOC) Concentrations (µg/L)

1,000

500

50

5

Boundary of the Former Northrop Grumman / NWIRP Site

Horizontal Scale (Feet)

0 2,000 4,000

Plume is based on the most recently available data from each sampling location collected between 2007 and 2019. Data were collected from monitoring wells, vertical profile borings, remedial wells, and public supply wells.

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DEEP ZONE 3 MAXIMUM TVOC CONCENTRATIONS 2019

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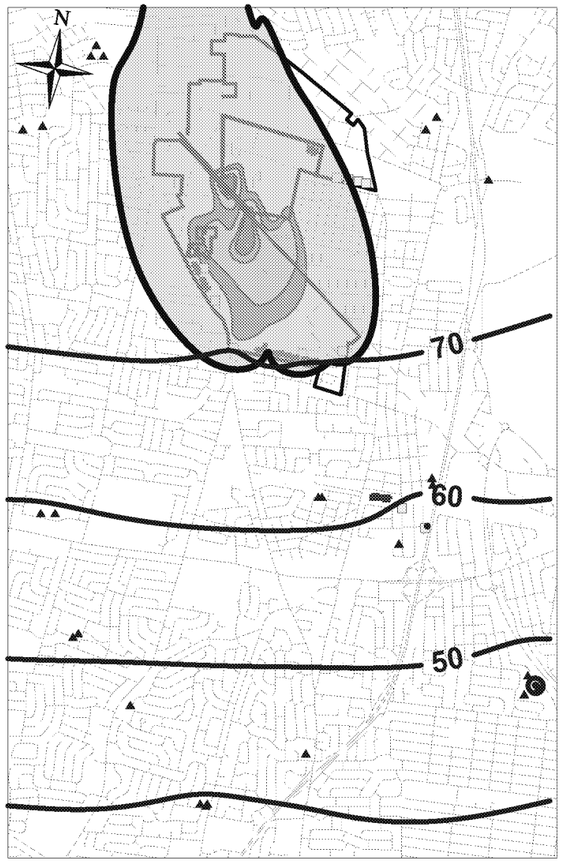
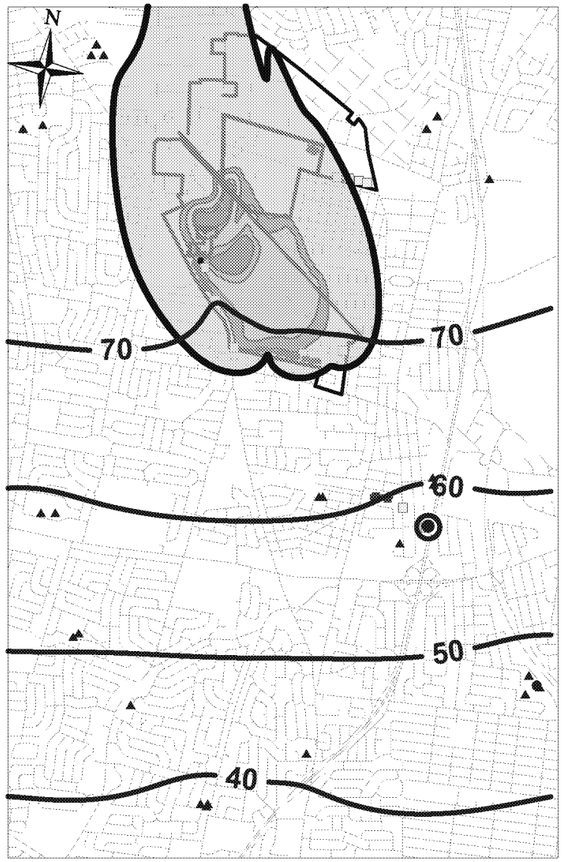
FIGURE 16

LAYER 5
(280-355 ft bls)

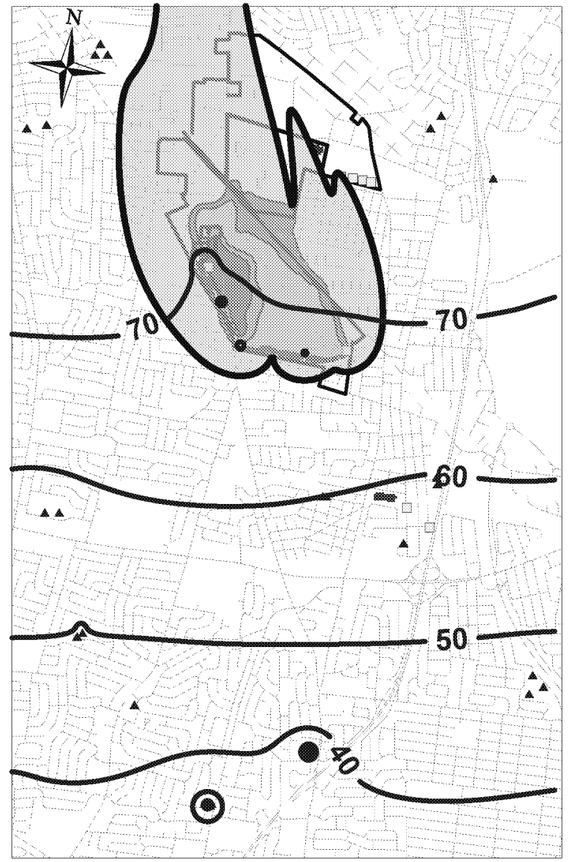


LAYER 6
(355-430 ft bls)



LAYER 7
(430-505 ft bls)

LAYER 8
(505-580 ft bls)



LEGEND

- Site Outline
- Recharge Basin
- Water Supply Well
- Remediation Well
- 5 — Simulated Layer-Specific Groundwater Elevation
- Simulated Steady-State Capture Zone at the end of 2019

*Recharge basins, water supply wells, and remediation wells are shown on each panel for reference regardless of layer designation.
**Pumping wells are also shown regardless of pumping status (wells that are not pumping are shown).
***Simulated TVOC concentration distribution is a result of transient flow and solute transport modeling from January 1 through December 31, 2019.
****Layer depths are specific to the South Recharge Basin location. Layer depths increase to the south.

TVOCs Concentration (μg/L)

5 — 50 — 500 — 1,000

Scale in feet

0 — 4,000 — 8,000

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MODEL SIMULATED GROUNDWATER ELEVATIONS AND GROUNDWATER CAPTURE ZONES: AT THE END OF 2019 - LAYERS 5 THROUGH 8

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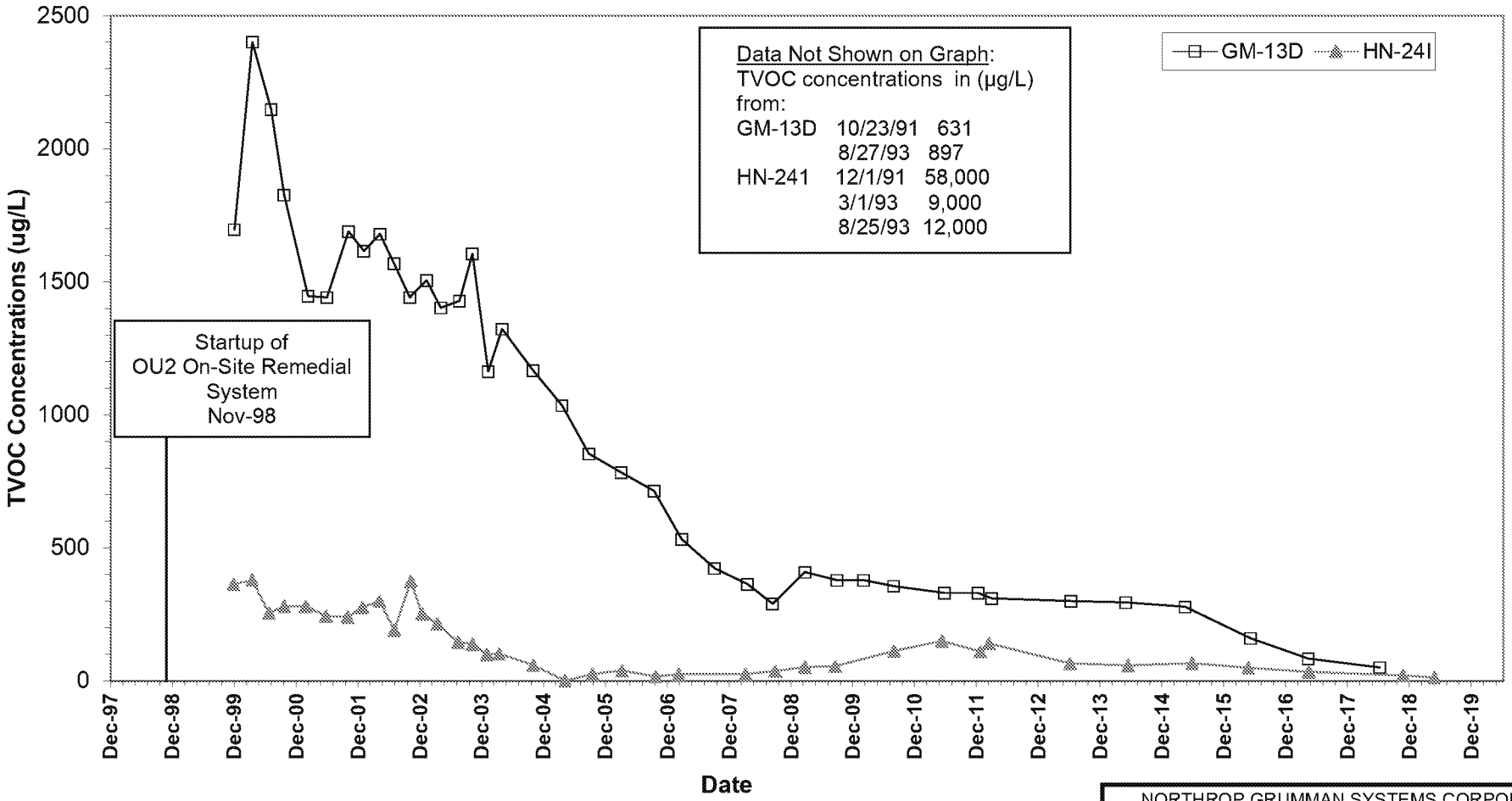
FIGURE 17



Abbreviation:

TVOC = Total volatile organic compound

Total VOCs = Sum of VOCs detected

µg/L = micrograms per liter

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Total Volatile Organic Compound Concentrations in Upgradient Intermediate and Deep Monitoring Wells

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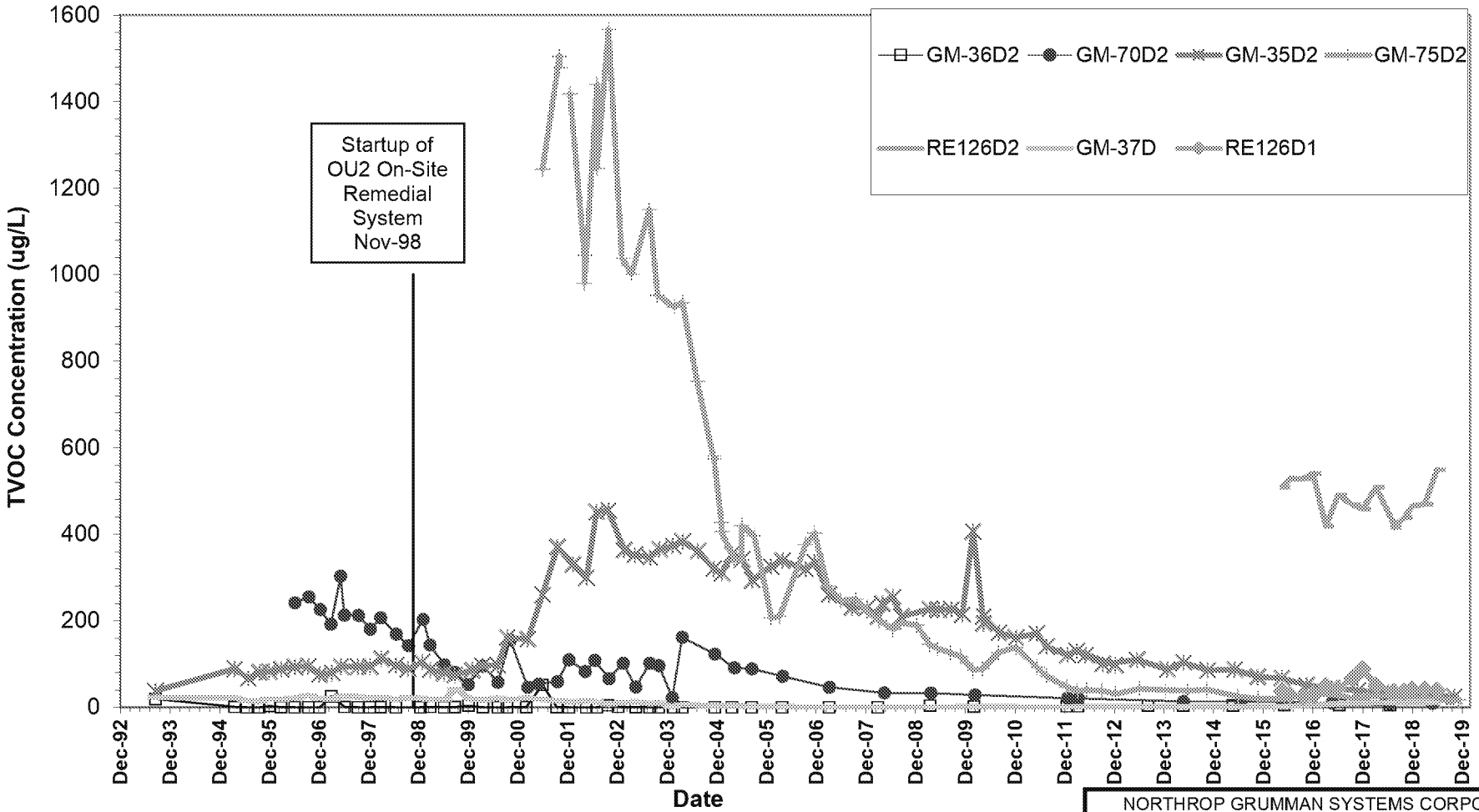
FIGURE 18

G:\APROJECT\Northrop Grumman Bethpage\OU2.2 ONCT\10 Final Reports\2019 Annual\Figures\Hydro Figures\Revised_Figure 7,8,18-20,23-25_TrendGraphs_020620DCFigure 18 - upgradient I,S 3/31/2020



Abbreviation:

TVOC = Total volatile organic compound

Total VOCs = Sum of VOCs detected

µg/L = micrograms per liter

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Total Volatile Organic Compound Concentrations in Deep and Deep2 Monitoring Wells Downgradient of OU2 ONCT System

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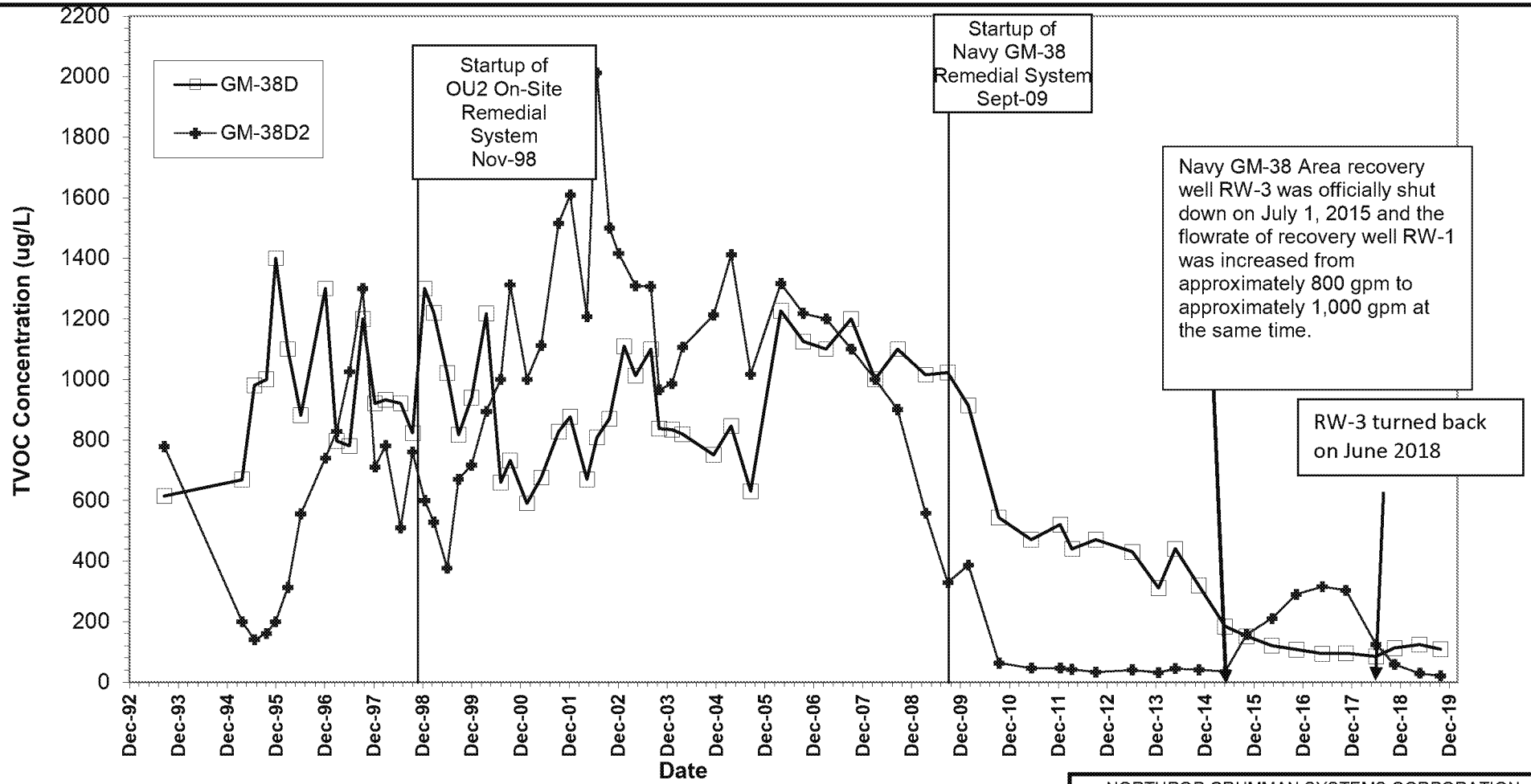
FIGURE 19

G:\APROJECT\Northrop Grumman Bethpage\OU2.2 ONCT\10 Final Reports\2019 Annual\Figures\Hydro Figures\Revised_Figure 7,8,18-20,23-25_TrendGraphs_020620DCFigure 19 - offsite 3/31/2020



Abbreviation:

TVOC = Total Volatile organic compound

Total VOCs = Sum of VOCs detected

µg/L = micrograms per liter

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Total Volatile Organic Compound Concentrations in GM-38 Area Deep and Deep2 Monitoring Wells

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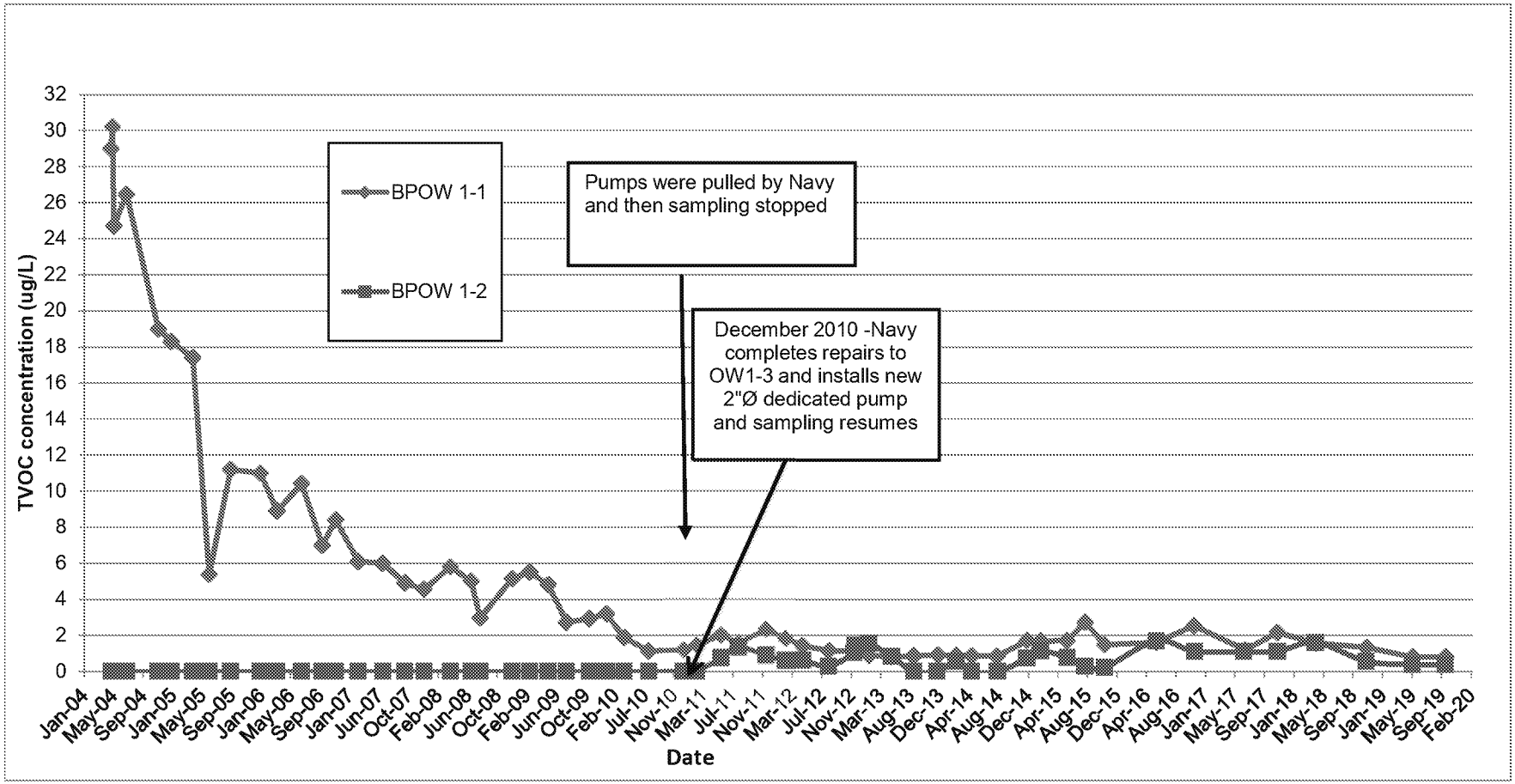
FIGURE 20

G:\APROJECT\Northrop Grumman Bethpage\OU2.2 ONCT\10 Final Reports\2019 Annual\Figures\Hydro Figures\Revised_Figure 7,8,18-20,23-25_TrendGraphs_020620DCFigure 20

3/31/2020



Notes and Abbreviations:

TVOCs: Total Volatile Organic Compounds
SFWD: South Farmingdale Water District
ug/L = micrograms per Liter

Total VOCs= Sum of VOCs Detected

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Total Volatile Organic Compound Concentrations in Offsite Outpost Wells BPOW1-1, BPOW1-2, (Wells monitor SFWD Well Field 1)

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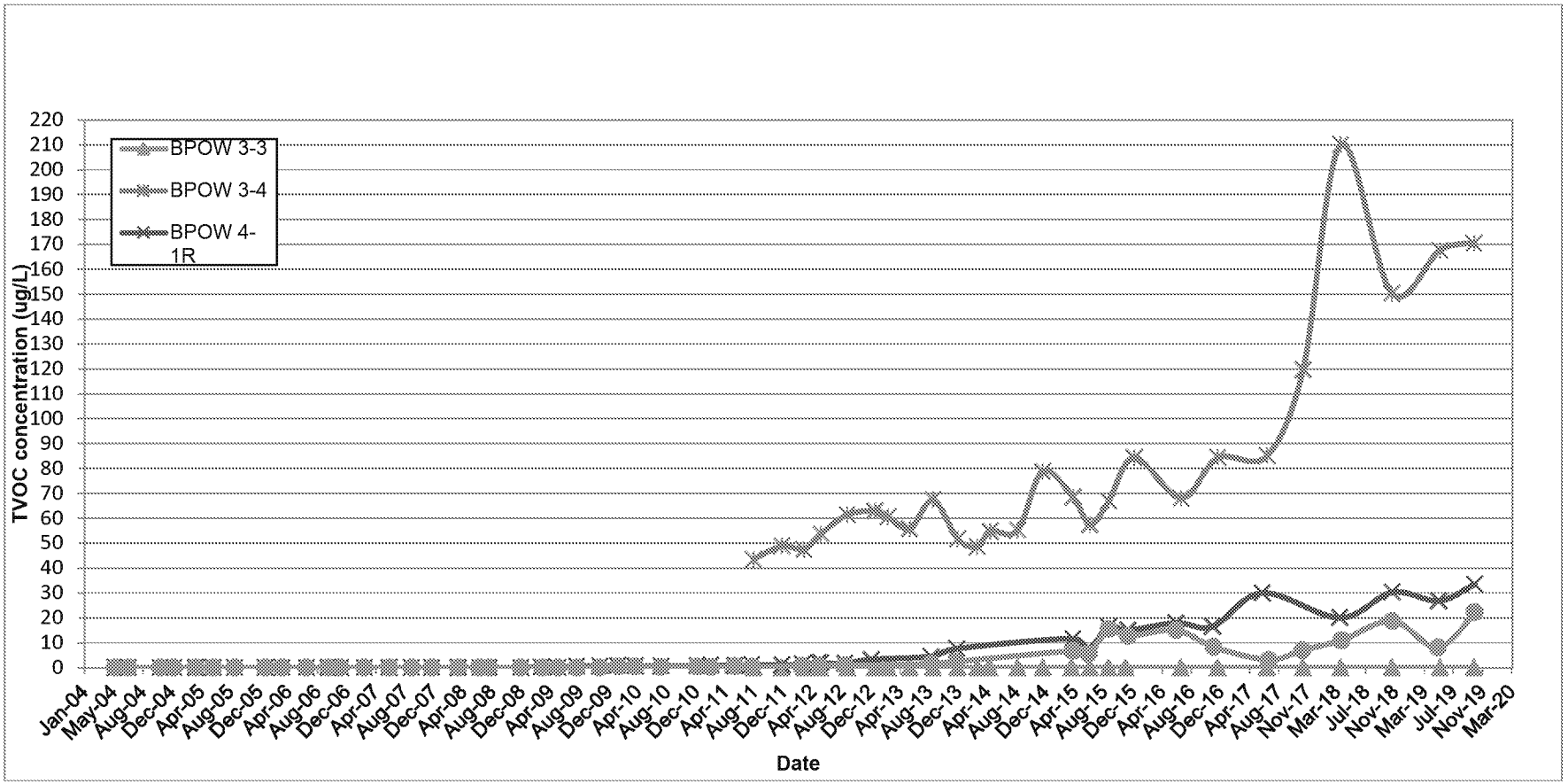
21

G:\APROJECT\Northrop Grumman Bethpage\OU2.2 ONCT\10 Final Reports\2019 Annual\Hydro Figures\Revised_Figure 21, 22_BPOW_TRENDGraphs_020620DCFig 21_offsite I,D

3/31/2020



Notes and Abbreviations:

TVOCs for both BPOW 3-1 and BPOW 3-2 are non-detect for the duration of the sample history
TVOCs: Total Volatile Organic Compounds
NYAW: New York American Water
ug/L = micrograms per Liter
Total VOCs= Sum of VOCs Detected

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Total Volatile Organic Compound Concentrations in Outpost Wells BPOW3-3, BPOW3-4, BPOW4-1R, and BPOW4-2R (Wells Monitor NYAW Seaman's Neck Well Field and Town of Hempstead Levittown Water District Well N-5303)

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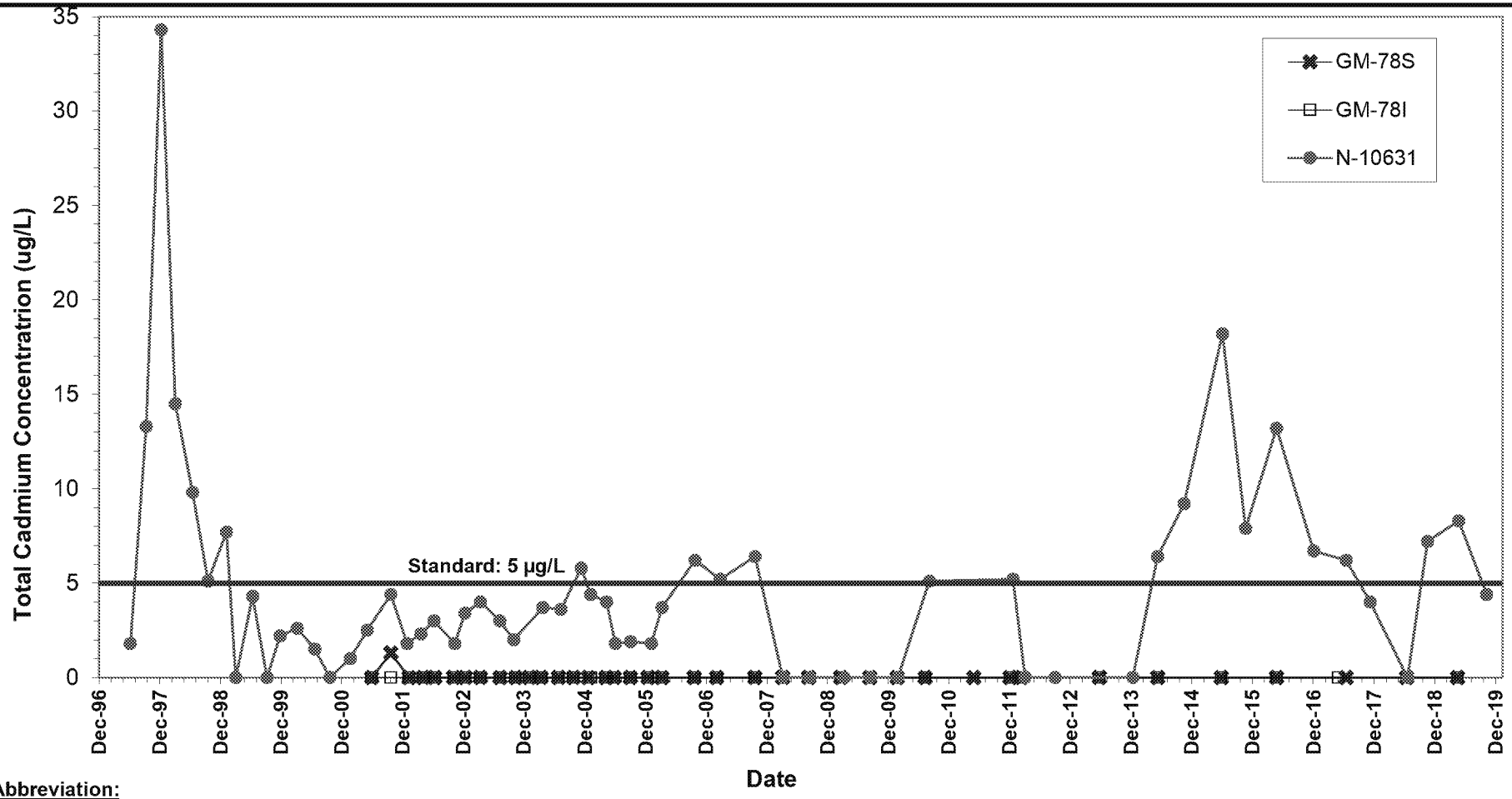
22



Abbreviation:

µg/L = micrograms per liter

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OPERABLE UNIT 2

Total Cadmium (unfiltered) Concentrations in Shallow Monitoring Wells Near Former Plant 2

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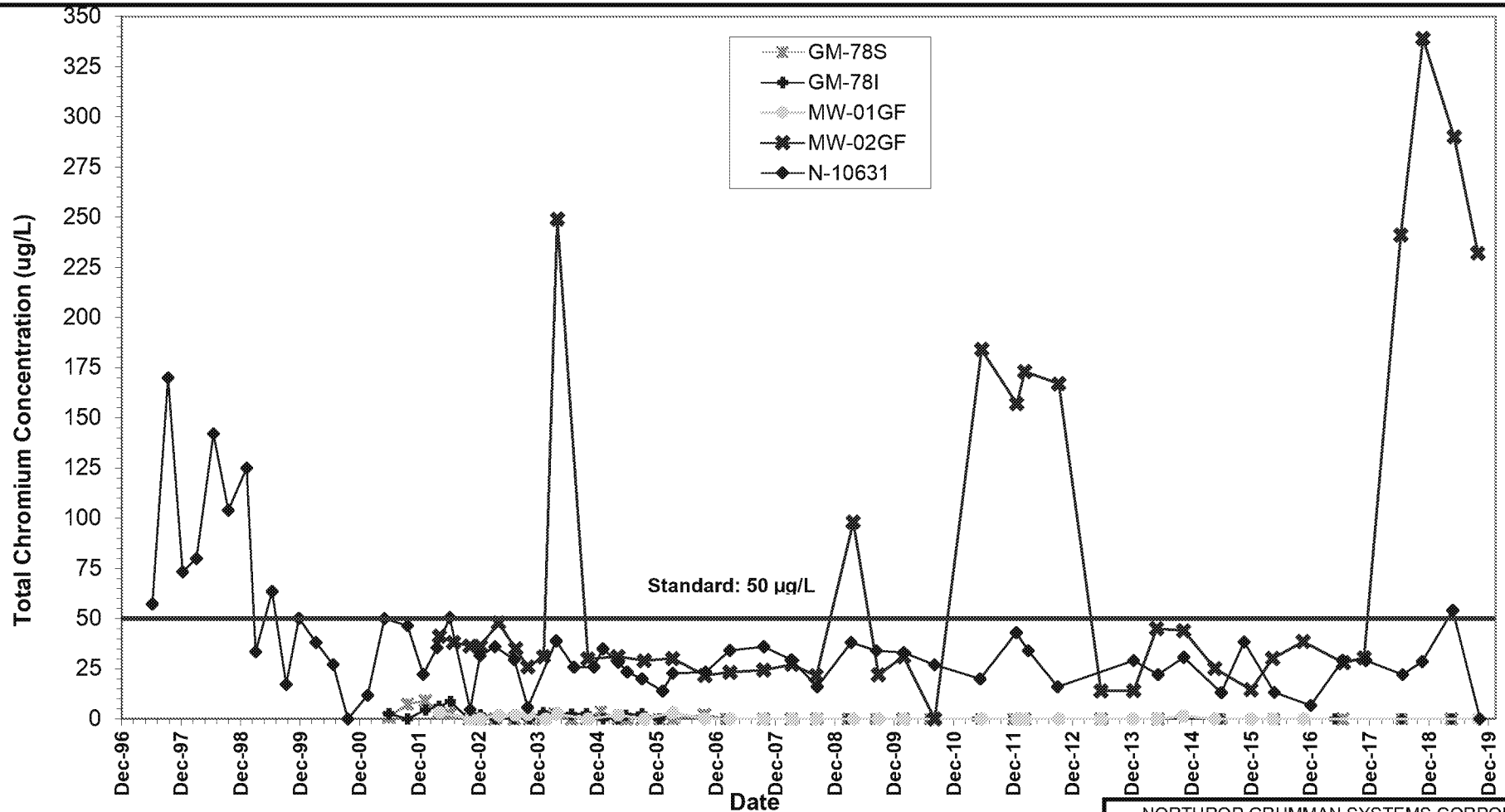
FIGURE 23



Abbreviation:

µg/L = micrograms per liter

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Total Chromium (unfiltered) Concentrations in Shallow Monitoring Wells Near Former Plant 2

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FIGURE 24

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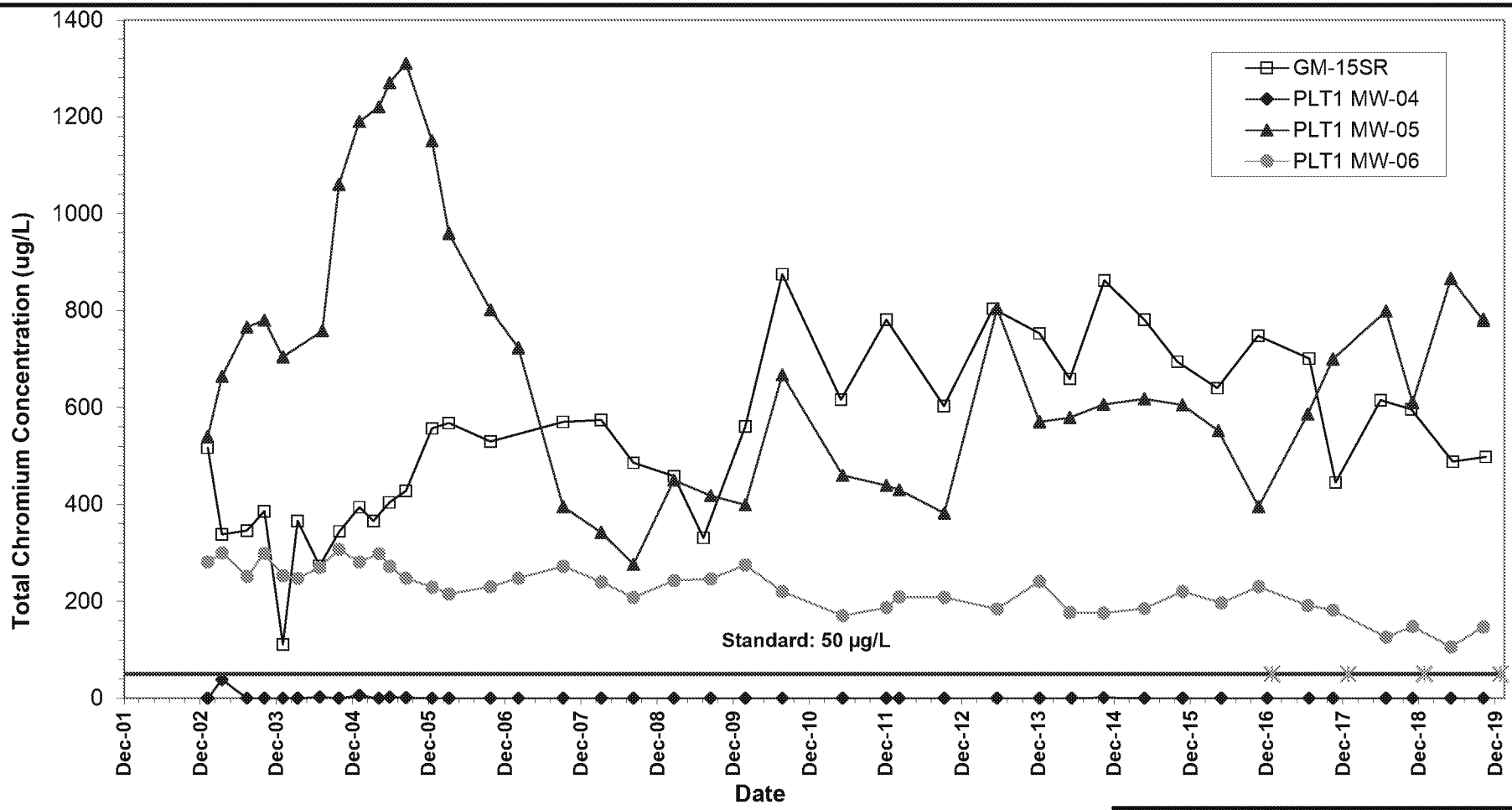
3/31/2020



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OPERABLE UNIT 2

Total Chromium (unfiltered) Concentrations in Shallow Monitoring Wells Near Former Plant 1

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FIGURE 25

Abbreviation:

µg/L = micrograms per liter

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3/31/2020